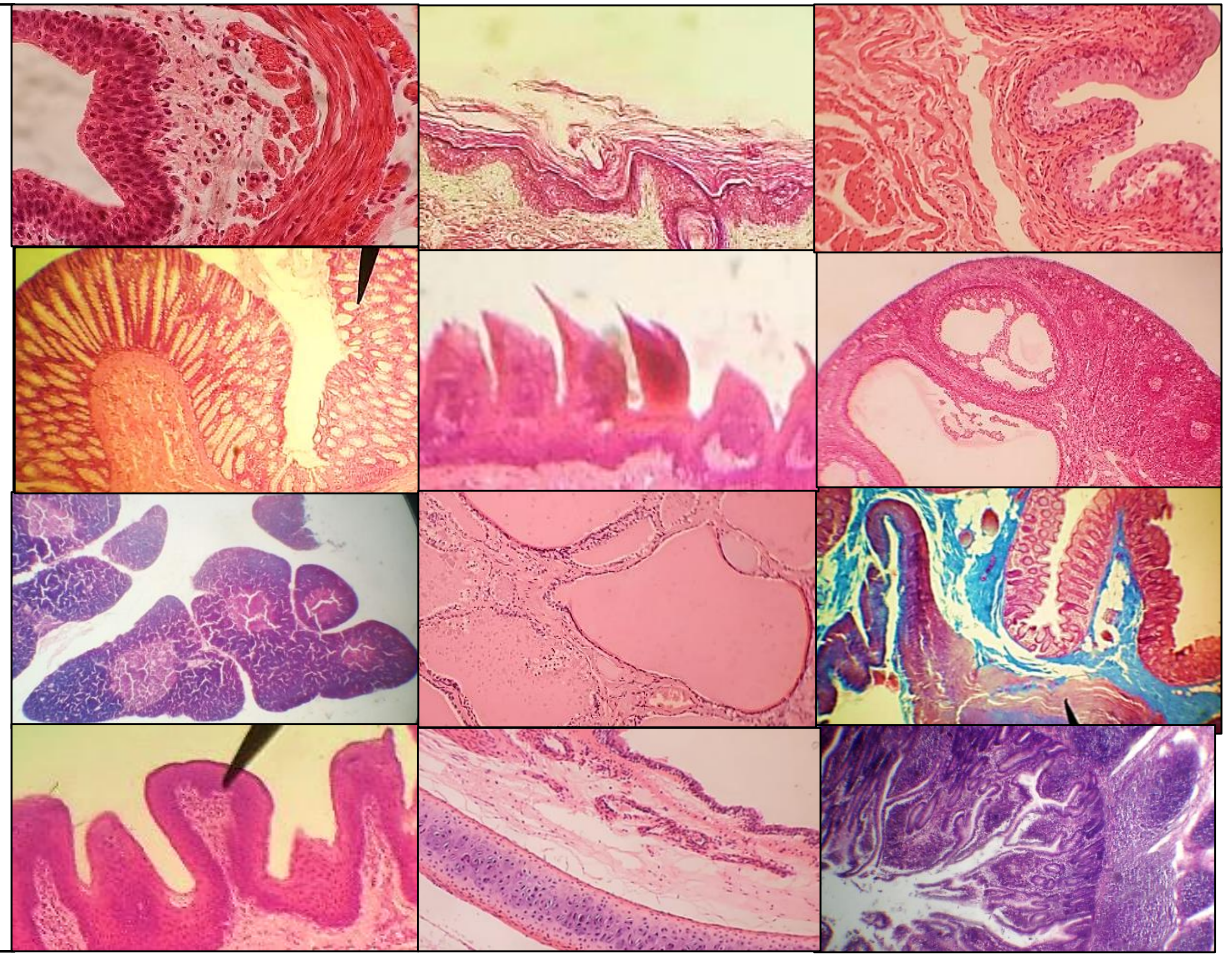
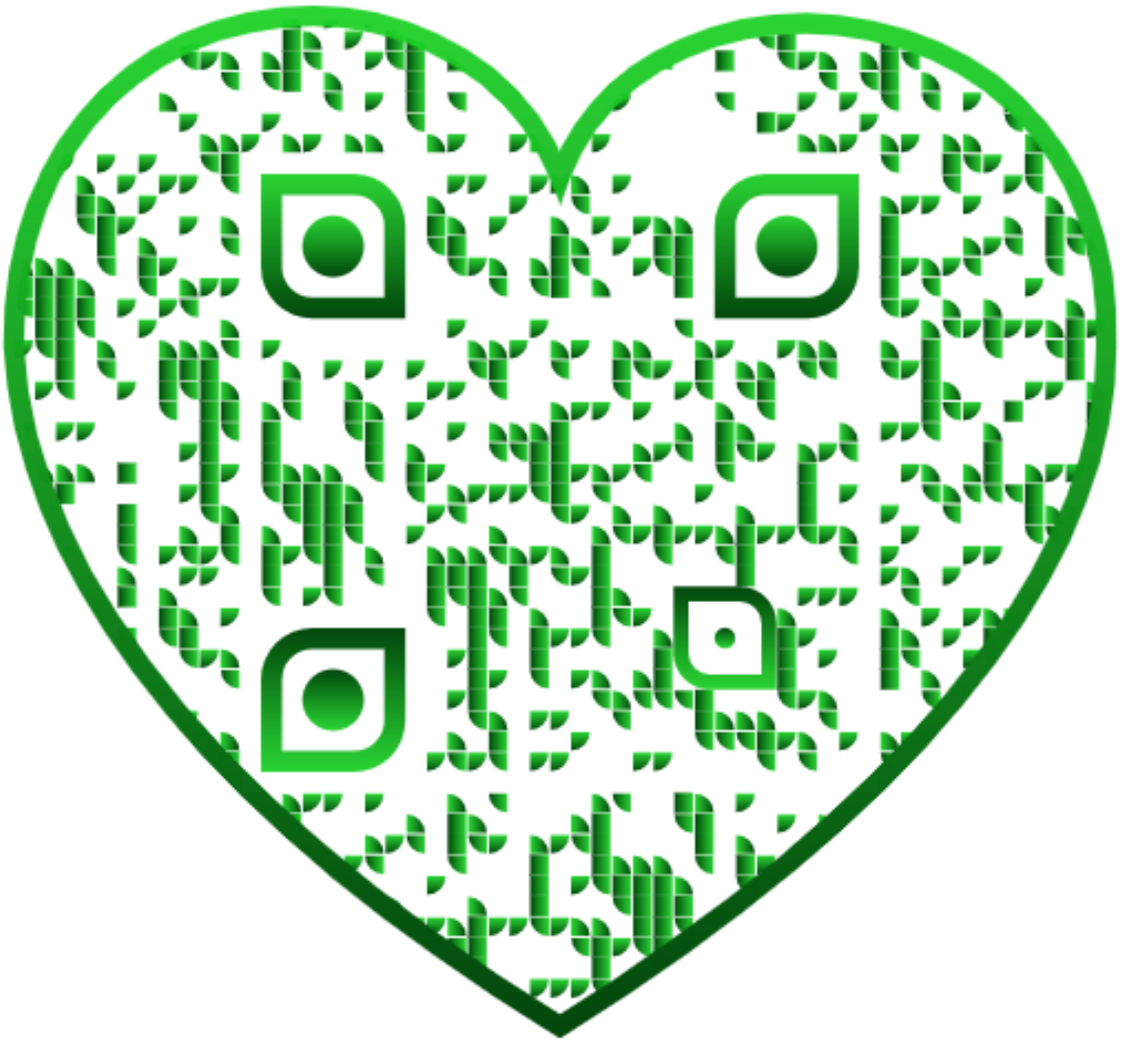
Histology lab.



Faculty of medicine
Sana'a university
Batch – 37A
2nd Year
All Histology labs



إعداد دائرة الهستولوجي – اللجنة العلمية A٣٧:

علياء المجمر	احمد الحيدري
احمد الرعود	محمد الصعفاني
امل الشميري	عبدالوهاب قشيش
محمد الزمر	فاطمة جوهر

مسؤول العملي :

أيمن الحميري

@xayler

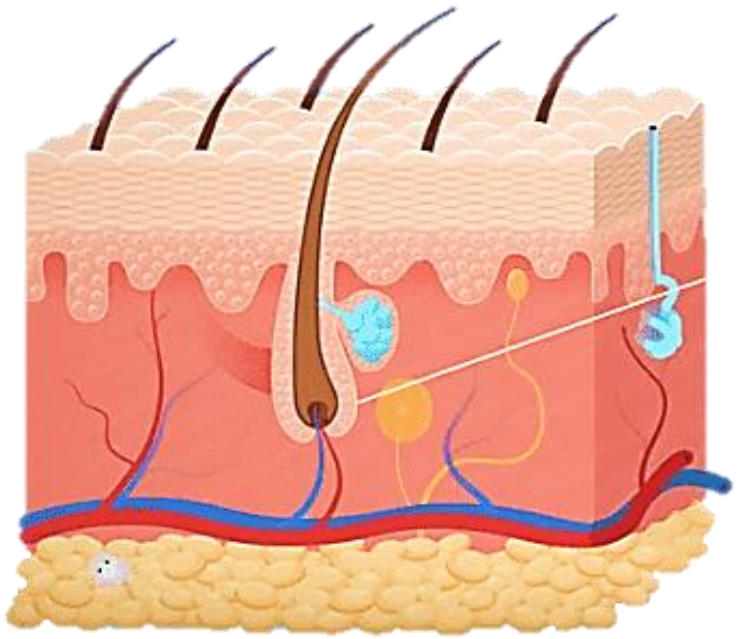
حاولنا نجمع ونتأكد من كافة المعلومات من دكاترة القسم الاكفاء، والمعذرة إذا في أي خطأ غير مقصود.

في حال وجود ملاحظة أو استفسار لا تتردد بالتواصل بالبوت الخاص بدائرة الهستولوجي..

@Histology37A_bot

للحصول على المزيد من الملخصات بما يخص جانب العملي :

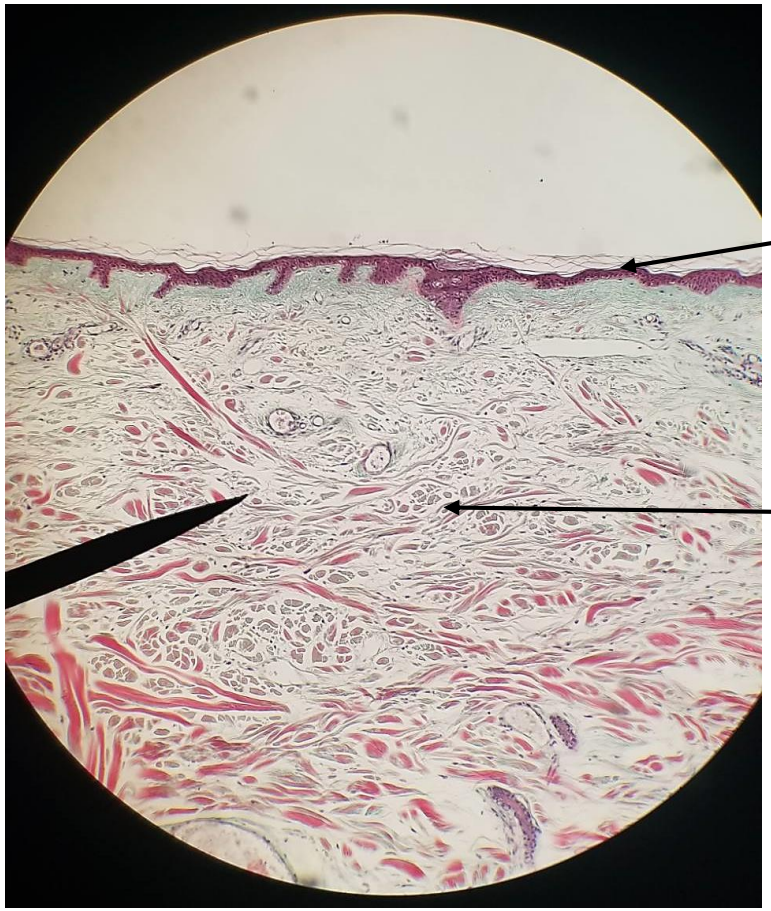
@practical37A



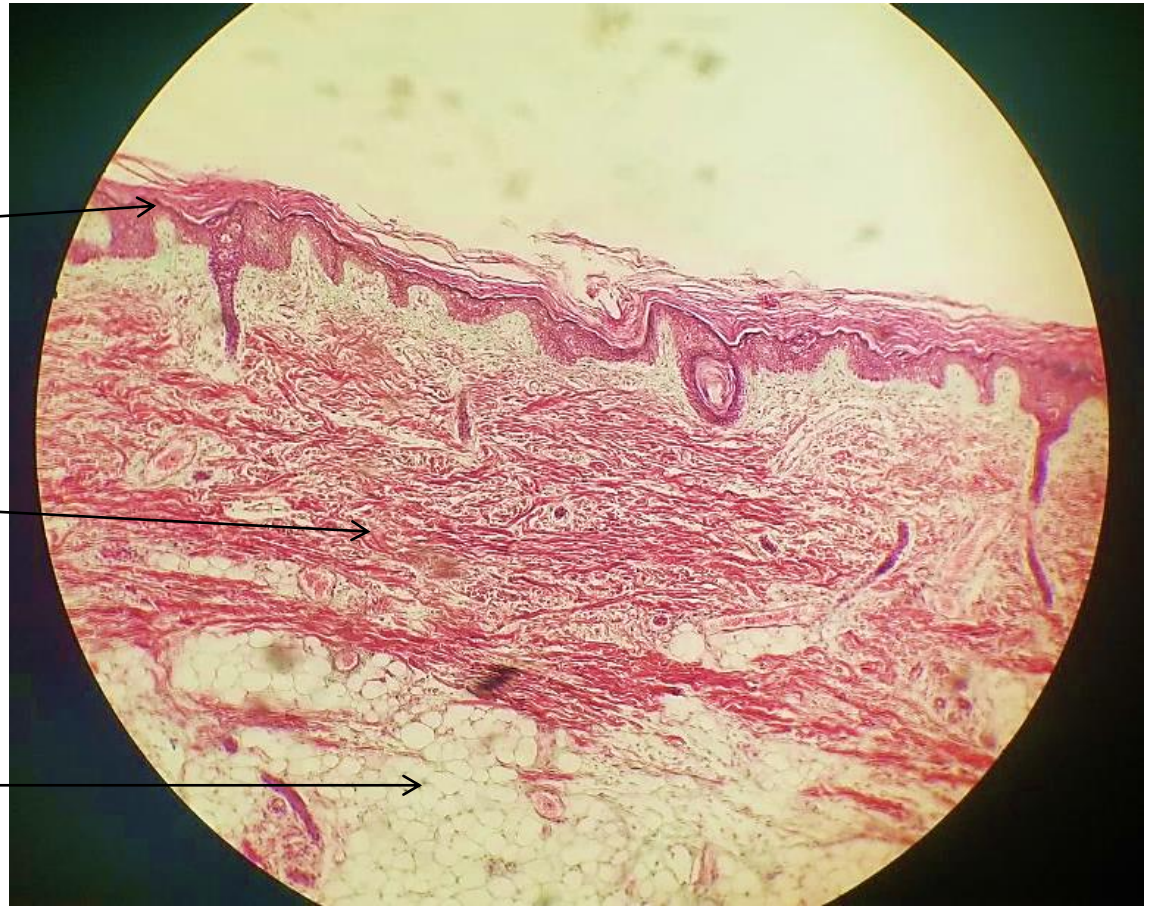
SKIN

Thick Skin

special stain



H.E stain



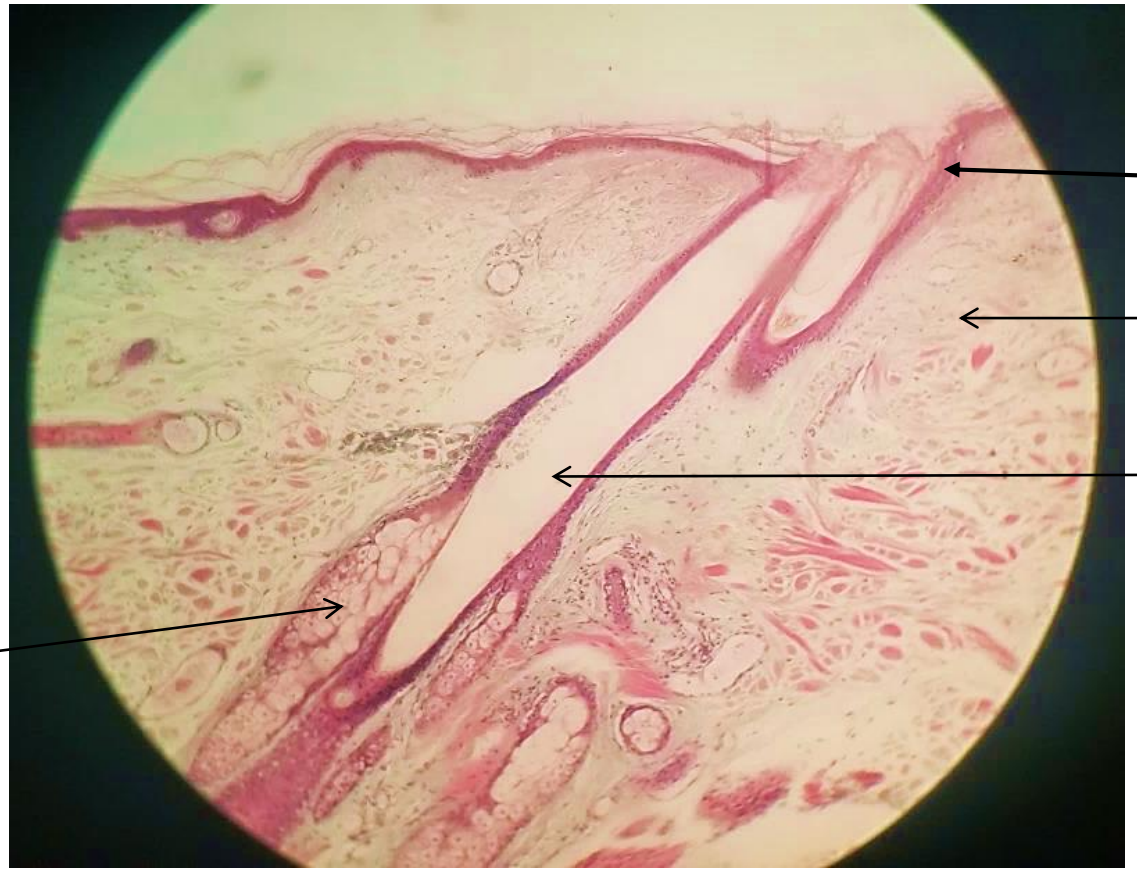
NOTES:

- Has NO hair follicles, NO sebaceous gland and NO arrector pili muscle.
- Epidermis is a keratinized stratified squamous epithelial tissue consists of 5 layers.
- Dermis is a dense irregular connective tissue, while hypodermis consists of adipose tissue.
- Found in palms and soles.

Thin Skin

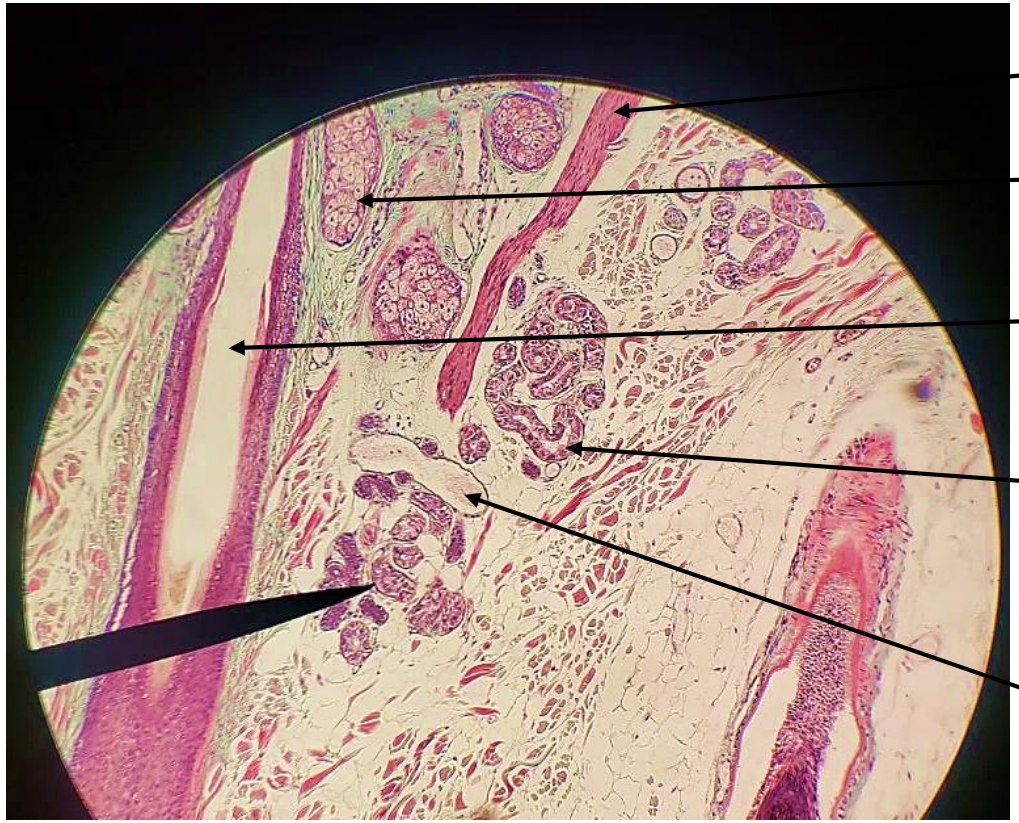
NOTES:
- Has hair follicles, sebaceous gland and arrector pili muscle.
- The hair follicle is the most common character of this slide (thin skin).
- The hair follicle is surrounded by a layer of keratinized stratified squamous epithelium.
- Found in most skin of the body.

H.E stain



Thin Skin cont.

special stain



Arrector pili m.

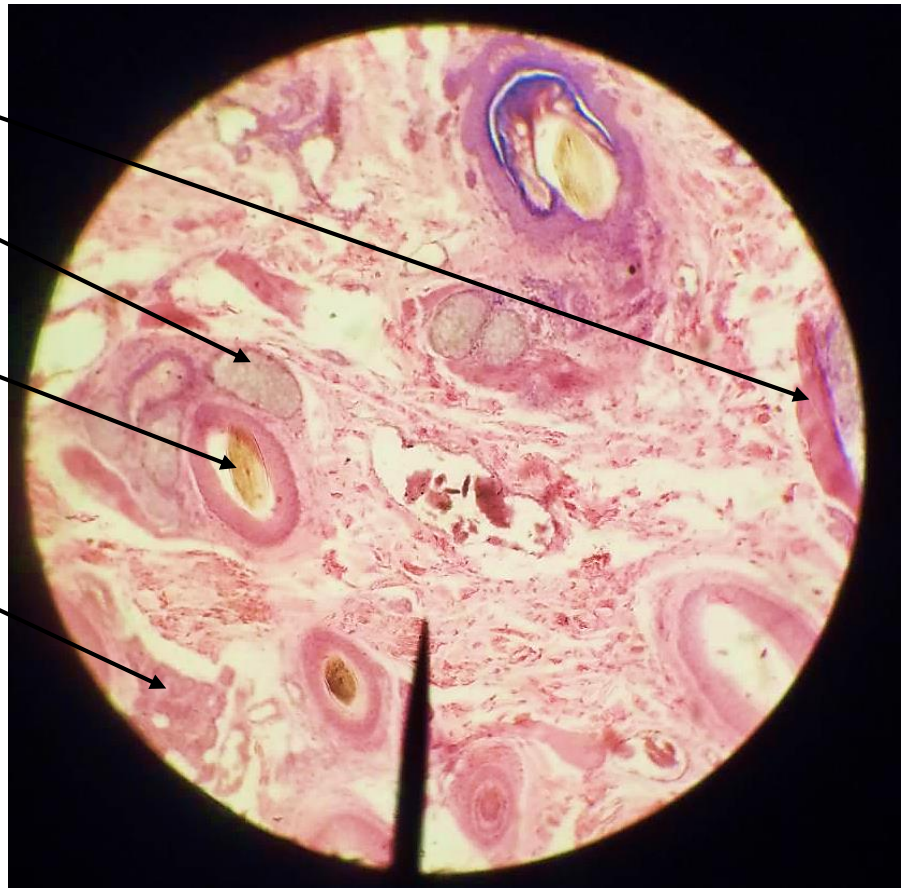
Sebaceous gland

Hair follicle

Sweat gland

Blood vessel (vein)

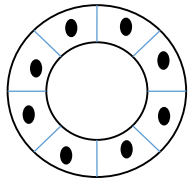
special stain

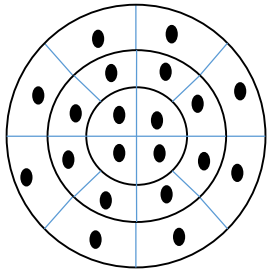


NOTE :

we can differentiate between sebaceous gland and sweat gland by the following:

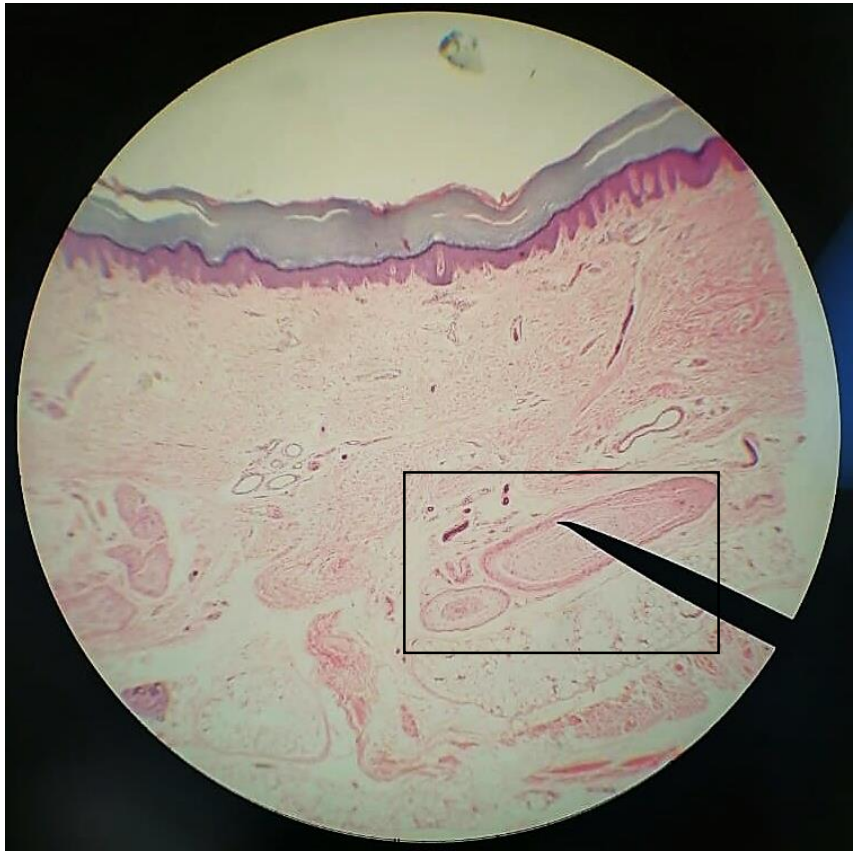
- The sweat gland is one layer and has a lumen.
- The sebaceous gland is multilayered and has no lumen.



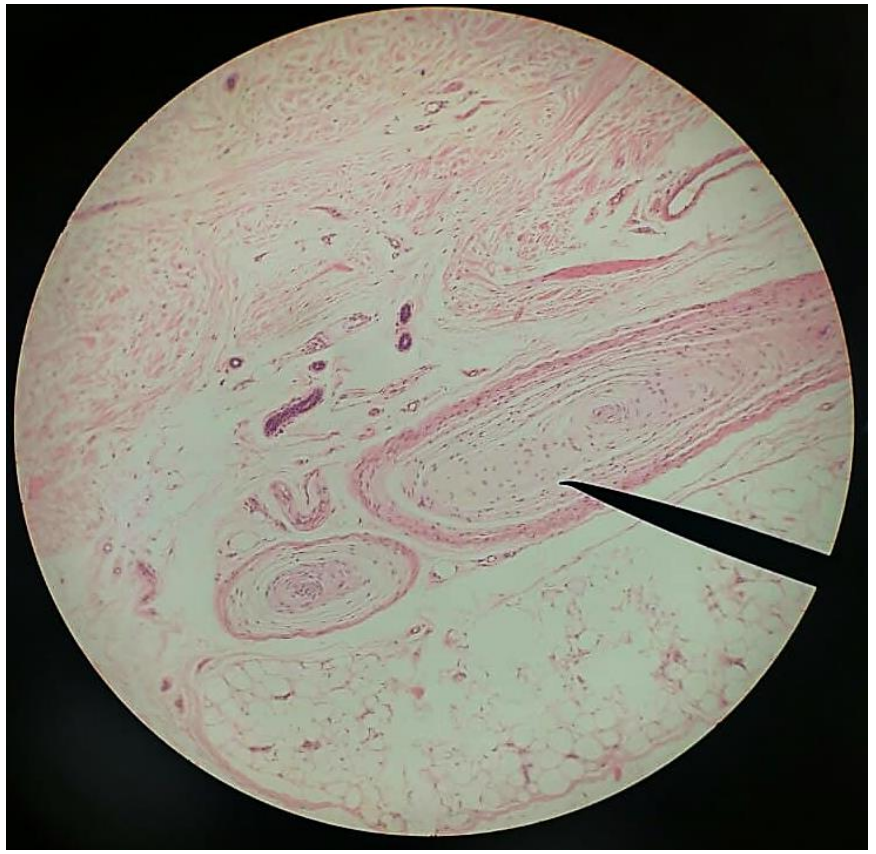


Pacinian corpuscle

special stain – low magnification

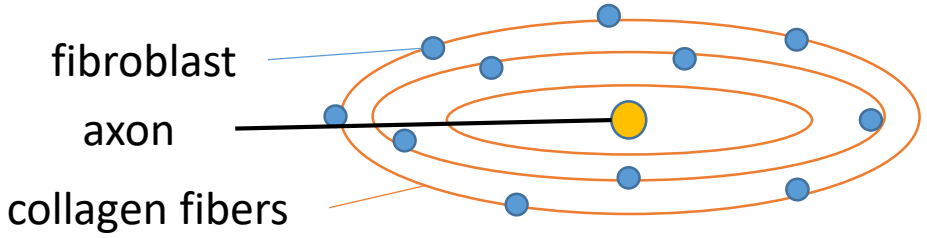


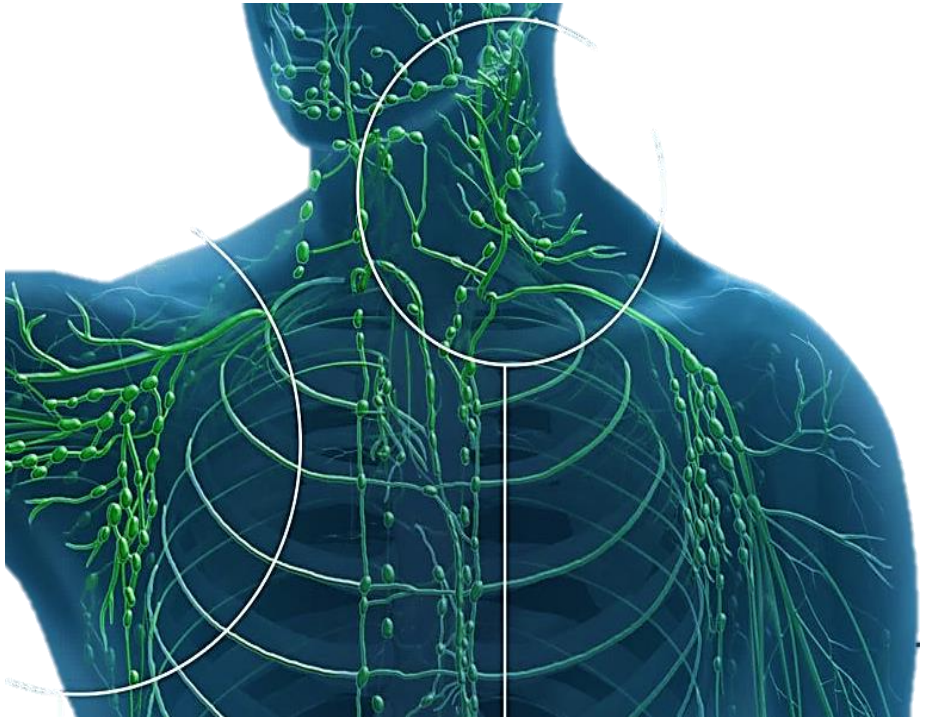
special stain – high magnification



NOTES:

- Appear in a pink color.
- Consists of axon, collagen fibers and fibroblasts.





LYMPHOID TISSUE

Lymph node

Low magnification - H.E stain

Medulla

Trabecula

Cortical sinus

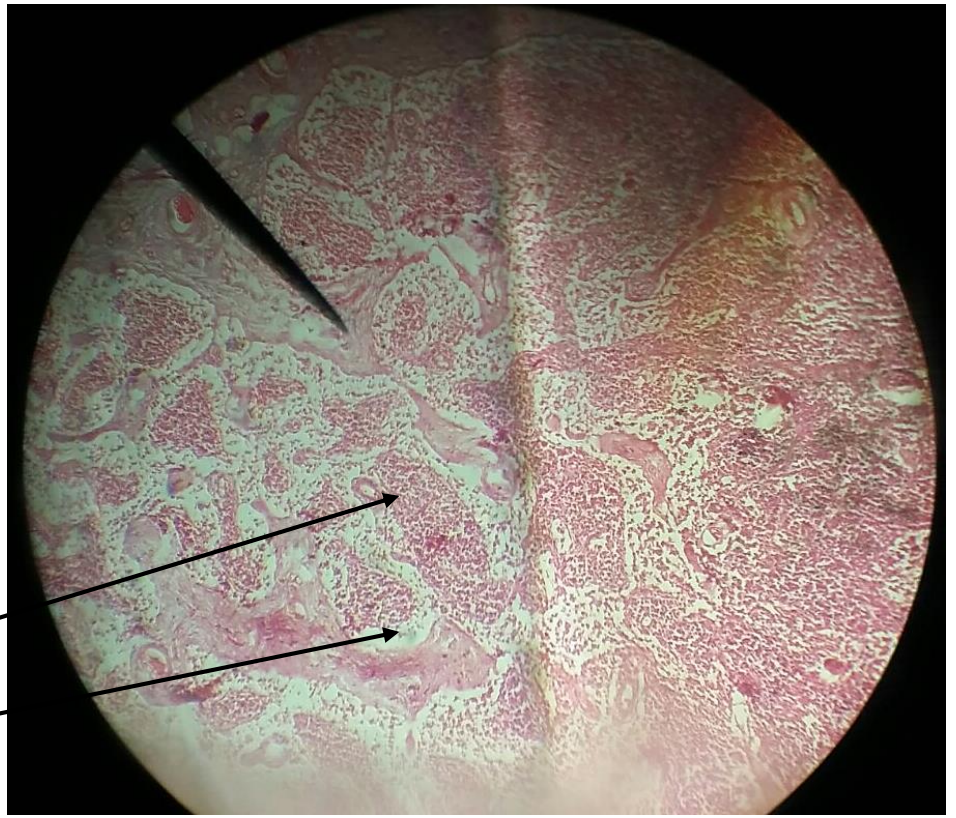
Lymph nodule

Cortex

medullary cord

medullary sinus

High magnification - H.E stain

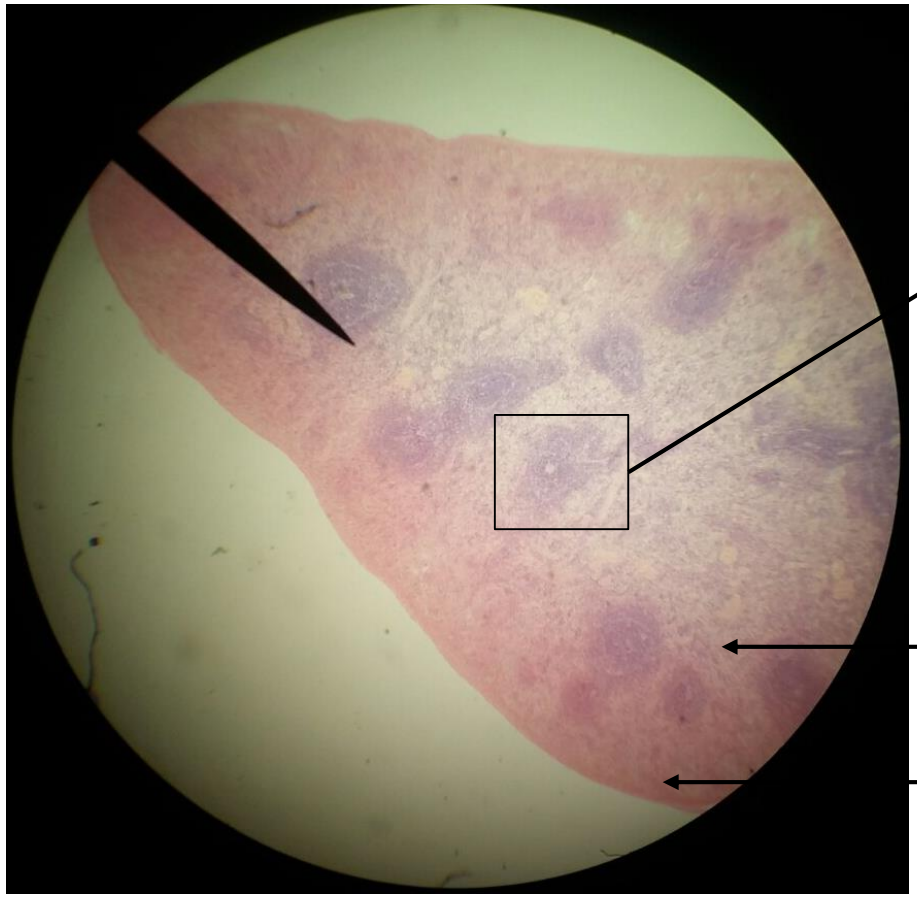


NOTES :

- Cortex has nearly a homogenous appearance.
- Medulla has small spaces which appear very pale which are the medullary sinuses. The medullary cords are the dark areas.
- Spaces between the lymph nodules in the cortex are cortical sinuses.

Spleen

H.E stain



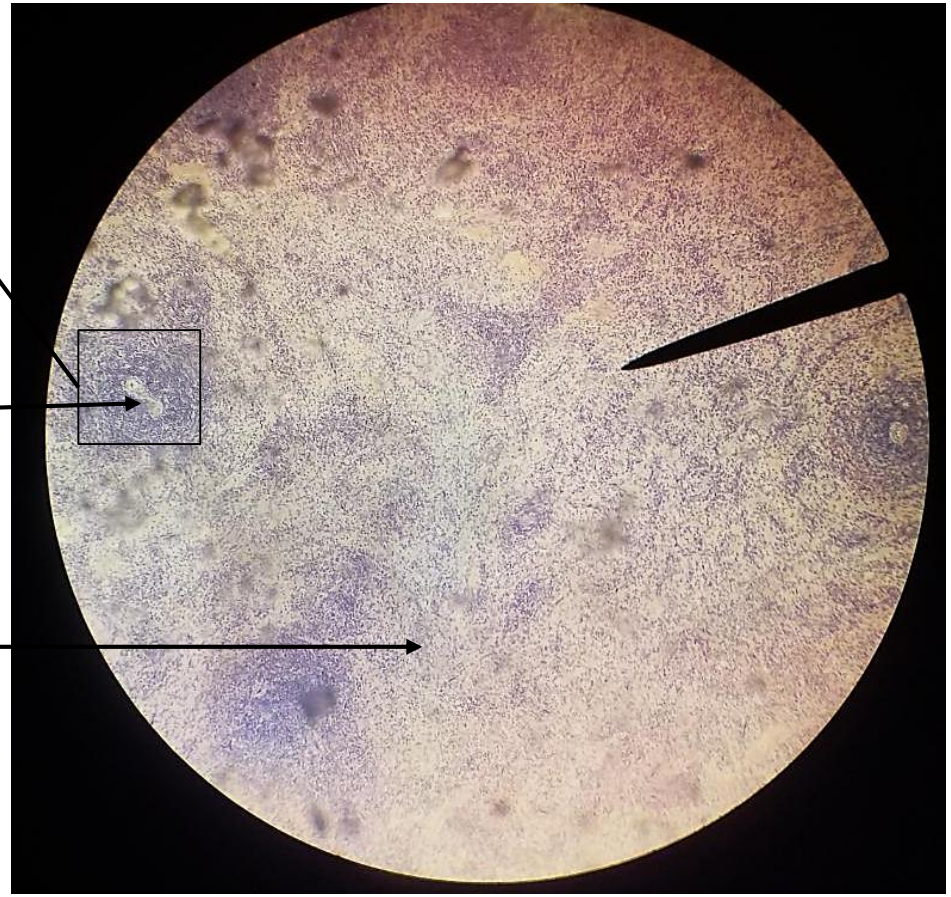
White pulp

Central artery

Red pulp

Capsule

H.E stain

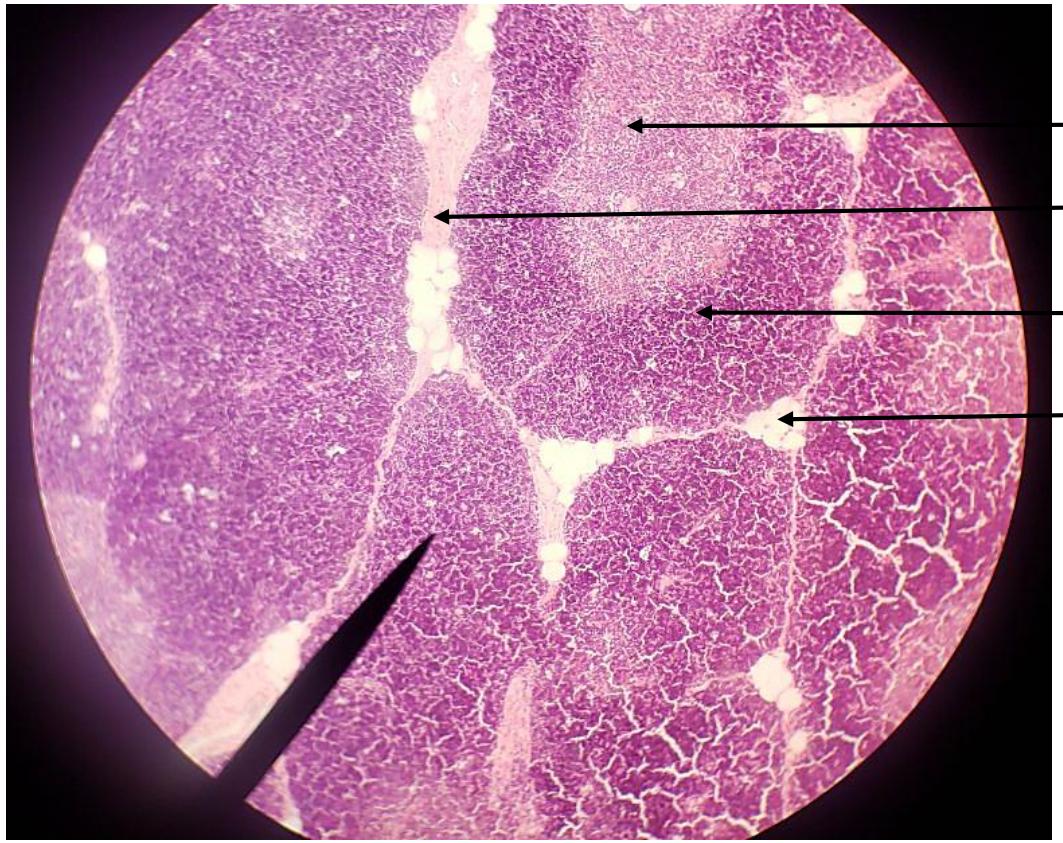


NOTES:

- No cortex and medulla.
- White pulps are distributed between the red pulps.
- The white pulp is a lymph nodule with a central artery.
- Red pulp consists of splenic cords & venous sinuses.

Thymus

H.E stain



Medulla

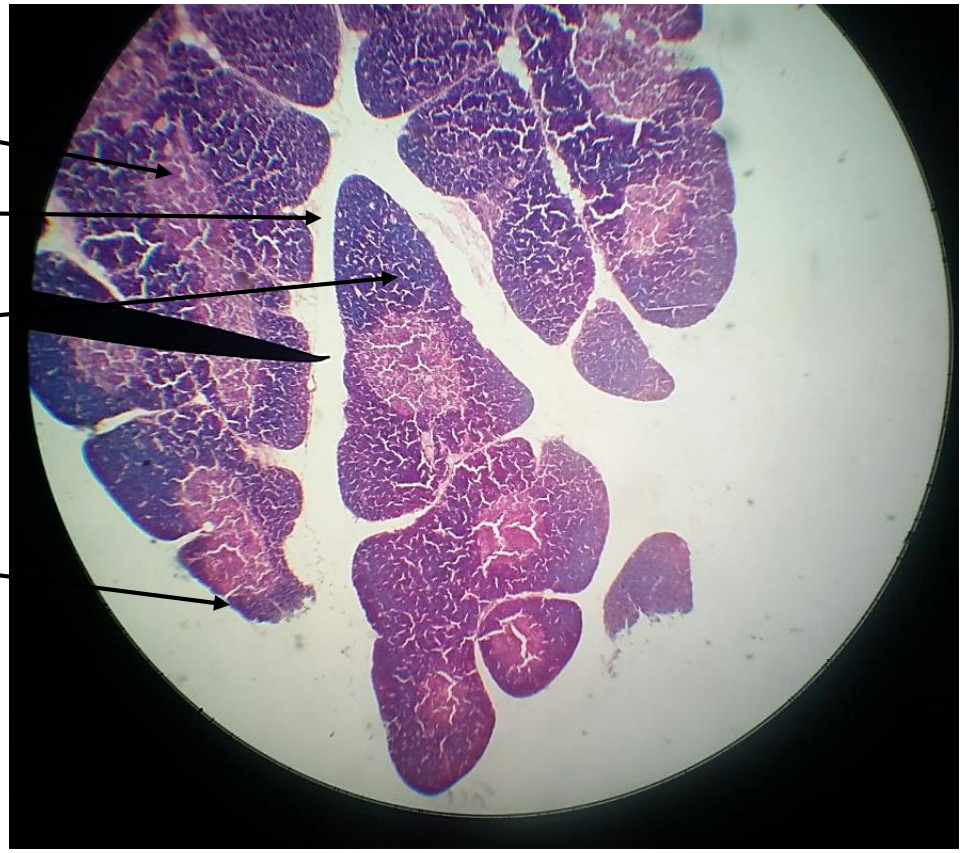
Trabecula

Cortex

Adipose tissue

Capsule

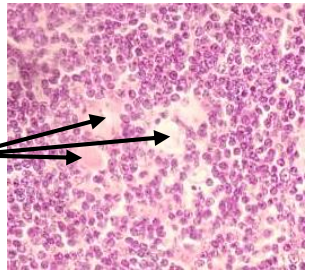
H.E stain



NOTES:

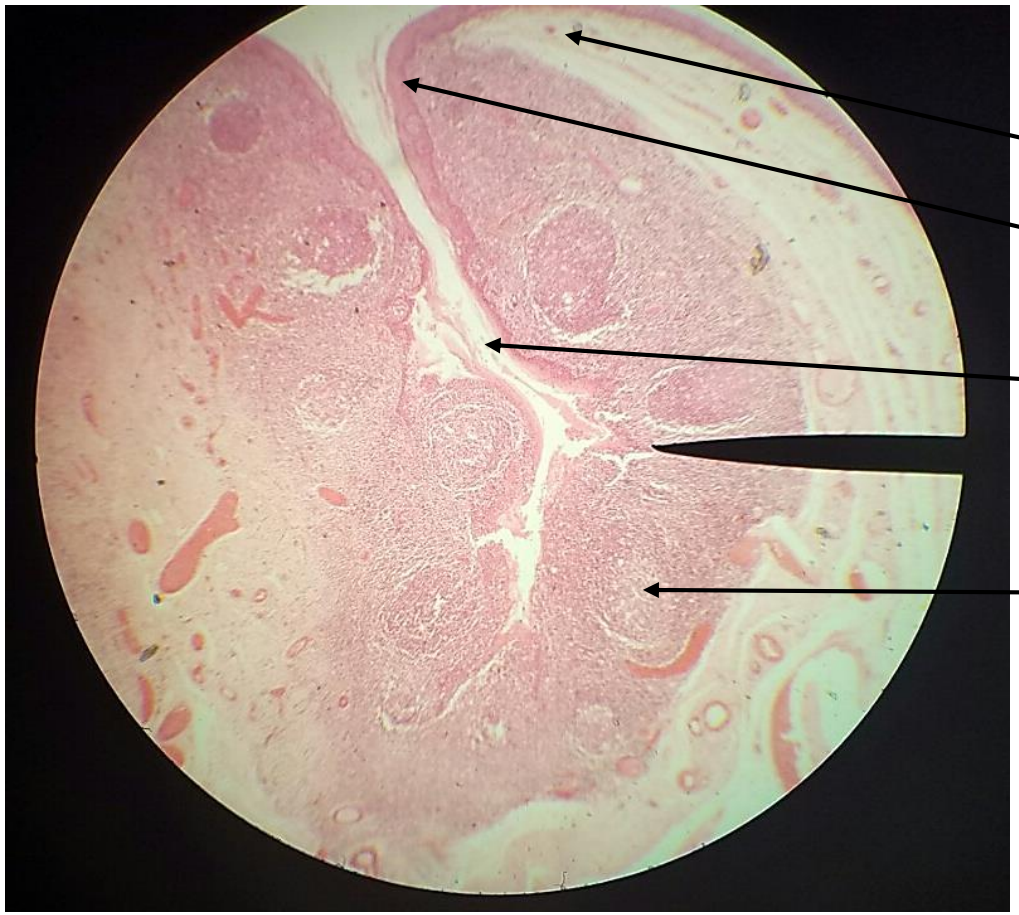
- Very distinct lobules each has its own cortex and medulla.
- The slide appears dark purple due to T-lymphocytes.
- Hassall's corpuscles appear most in medulla.

Hassall's corpuscles



Palatine tonsils

H.E stain



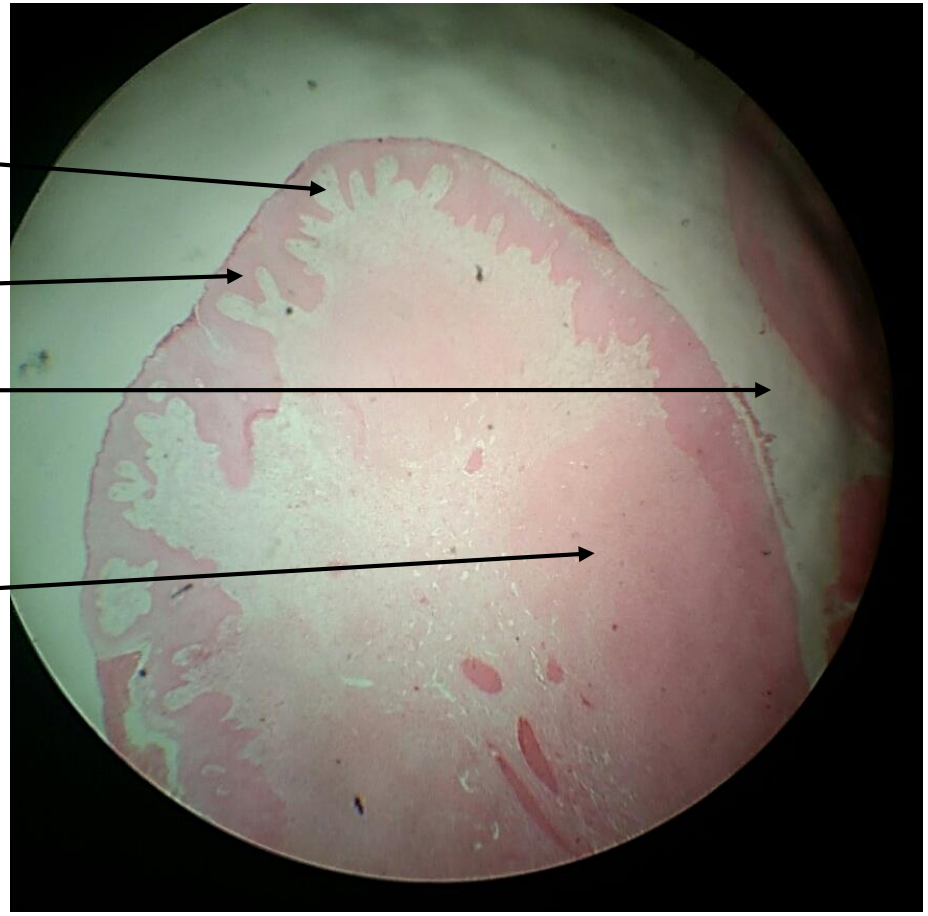
Lamina properia

Stratified squamous Epithelium

crypt

Lymph nodule

H.E stain



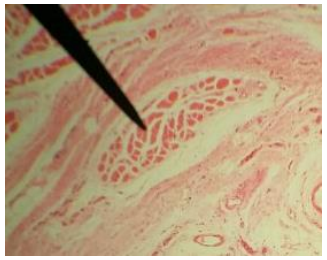
NOTES:

- The tonsils are covered with stratified squamous epithelium non-keratinized.
- The epithelium invaginates into the underlying lymphoid tissue forming the crypts.
- The lymphatic tissue is embedded in the CT under mucous membrane.

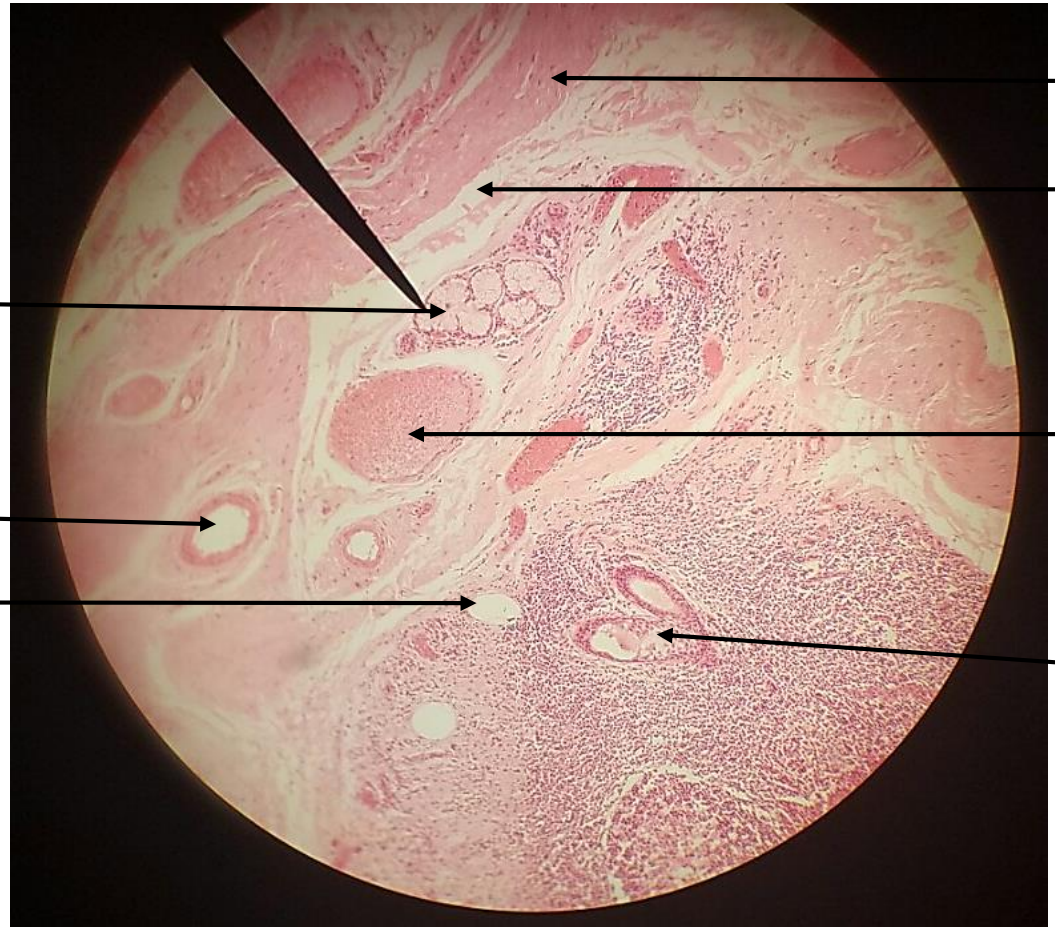
Palatine tonsil cont.

NOTES:

- This is another field of palatine tonsil slide.
- Ducts are simple cuboidal epithelium but we see it here stratified because of the slide making process.
- Blood vessels are lined by simple squamous epithelium
- Sometimes we see skeletal muscles of under laying structures (not related to the tonsil)



H.E stain



Fibers & cells of connective tissue

Lamina properia

Mucous gland

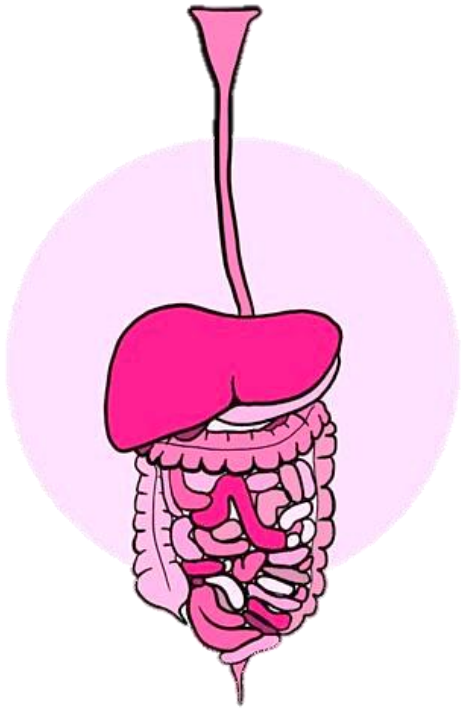
Lymph nodules

Blood vessel

Adipocyte

Mucous gland duct

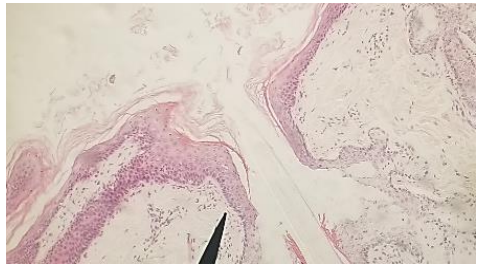
Lymph nodule



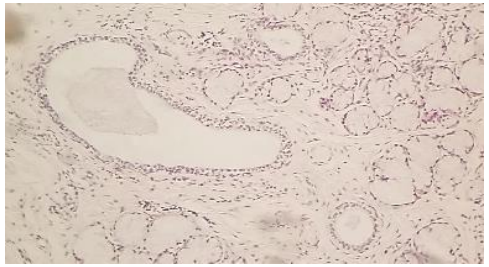
GASTROINTESTINAL TRACT

Lower lip

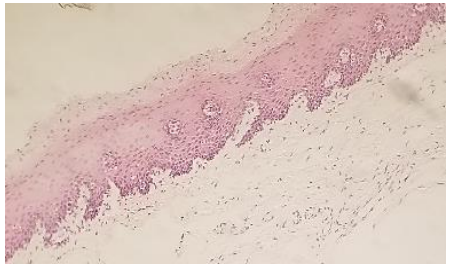
Outer surface



Labial glands



inner surface

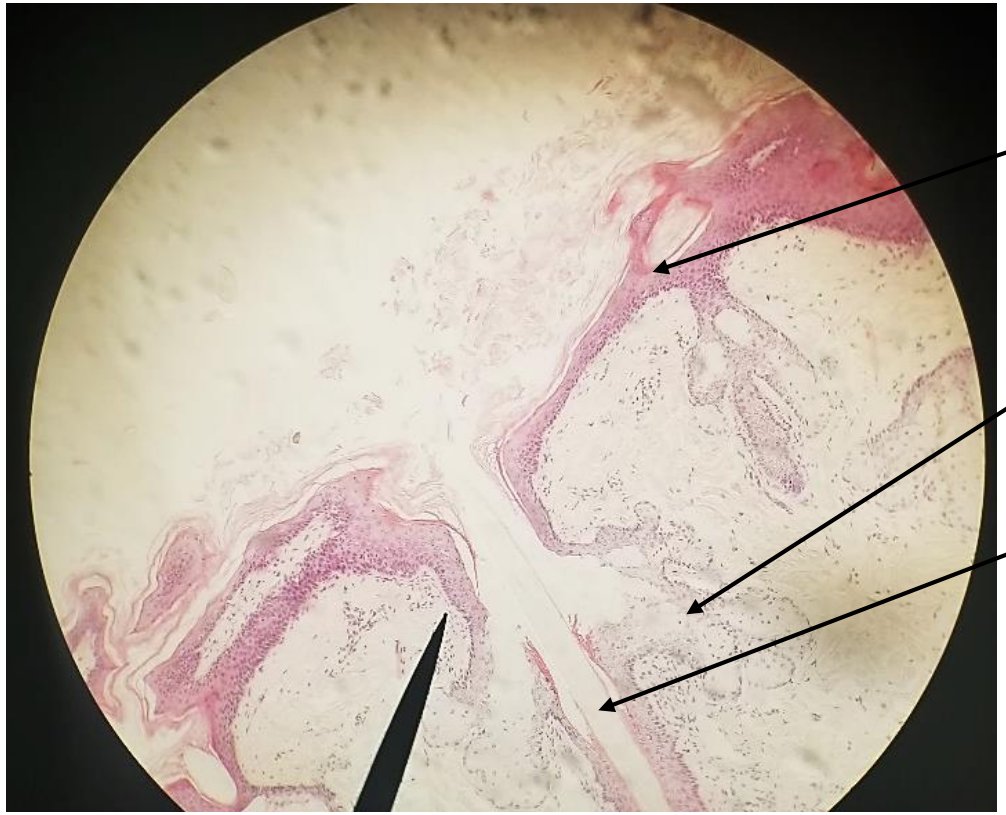


NOTE:

- We see those parts of lower lip in ONE slide.

Lower lip – outer surface

H.E stain

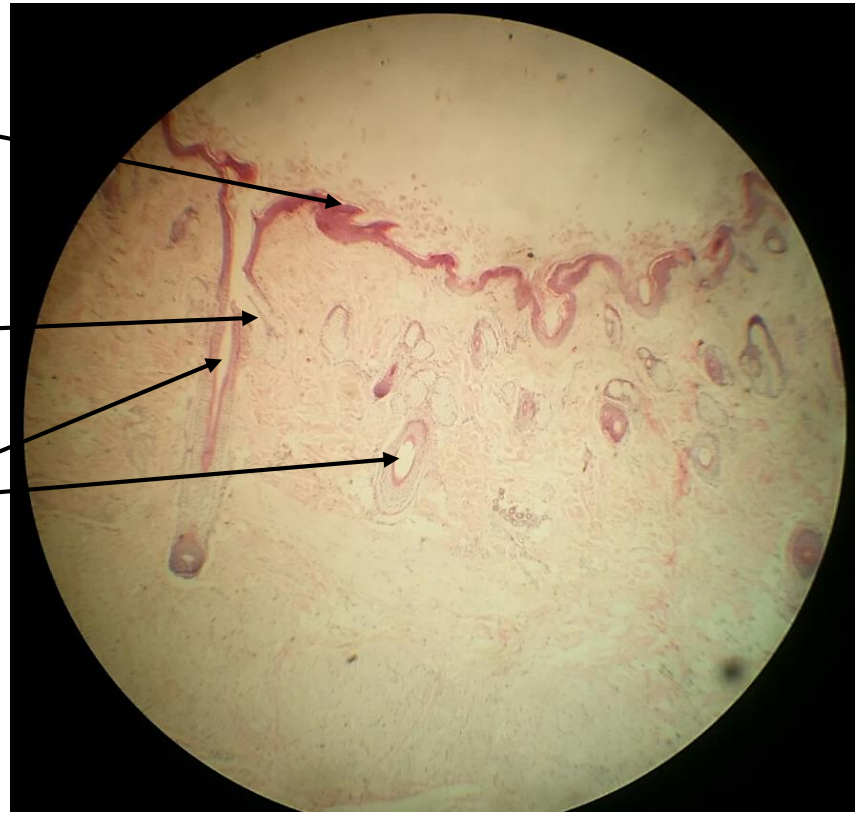


Keratinized stratified squamous epithelium

Sebaceous gland

Hair follicle

H.E stain

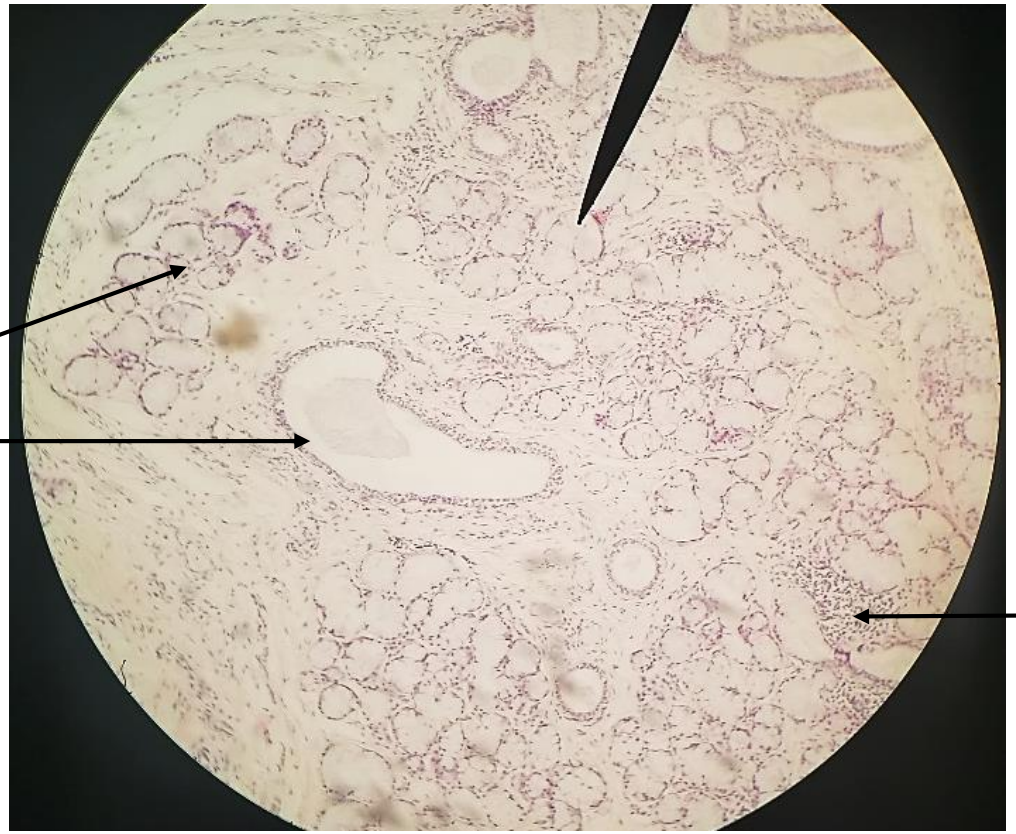


NOTE:

- The outer surface of the lip is a thin skin (Keratinized stratified squamous epithelium + hair follicle + sweat glands + sebaceous glands).

Lower lip – labial gland

H.E stain



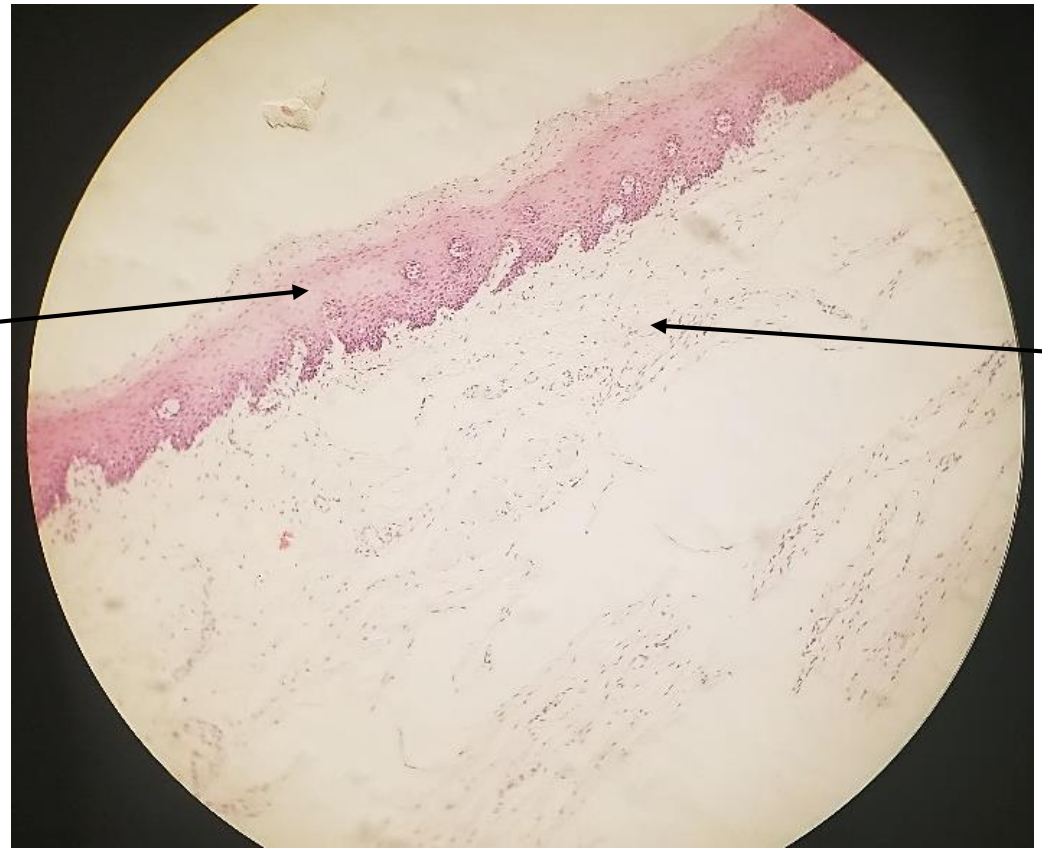
NOTES:

- Labial gland acini are formed of simple squamous epithelium.
- Labial gland ducts are formed of simple cuboidal epithelium.
- Lymphatic tissue appear as blue aggregation of cells.

Lower lip - Inner surface

H.E stain

Non-keratinized stratified squamous epithelium

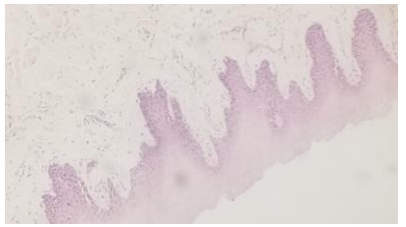


Lamina propria

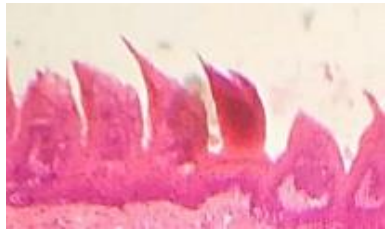
Tongue

Dorsal surface

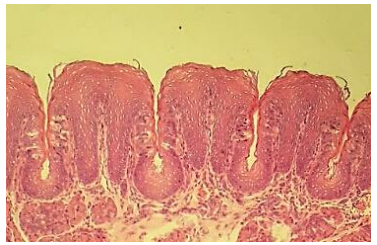
Ventral surface



Filiform papillae



Circumvallate Papillae



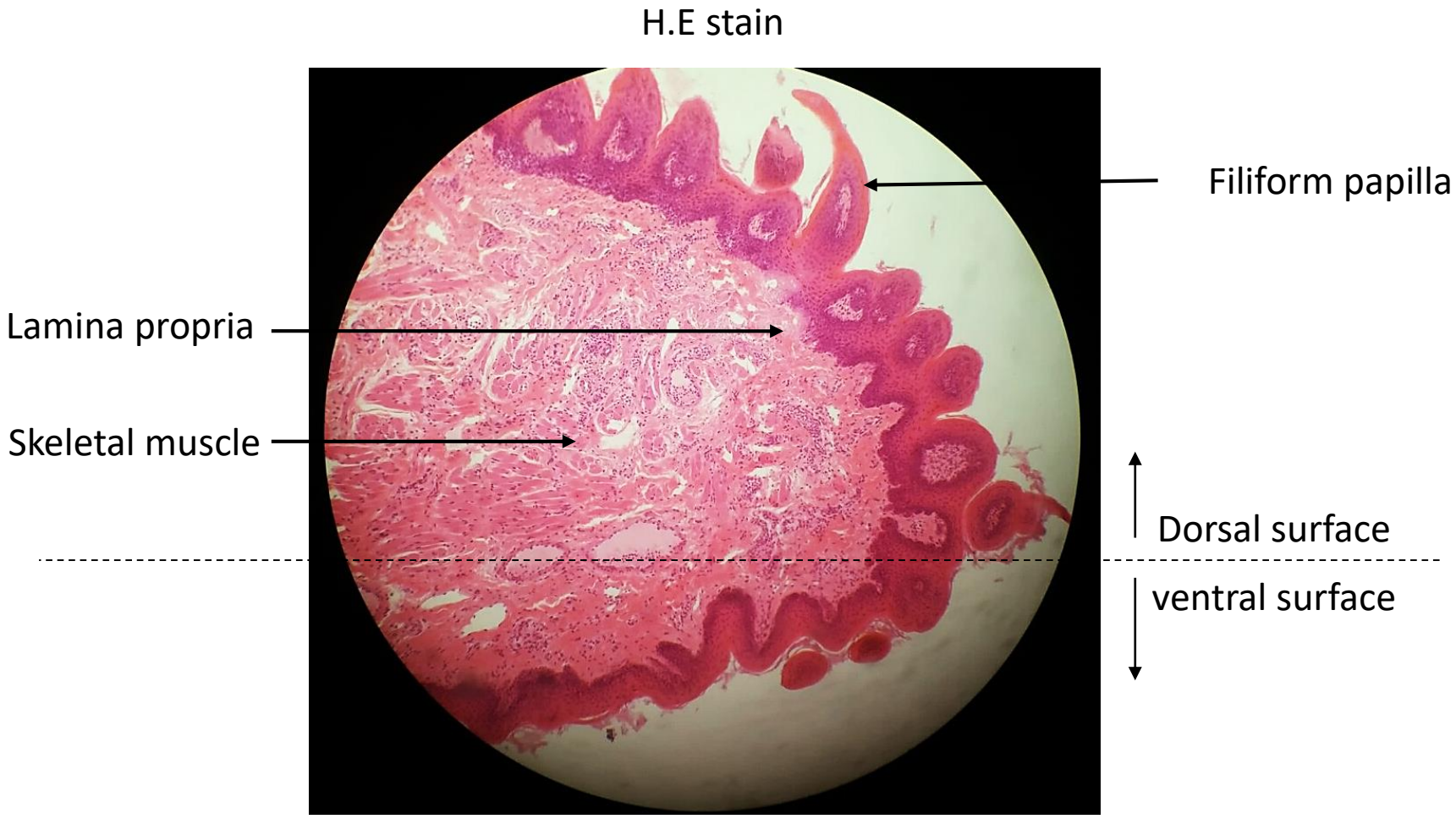
Fungiform Papillae

NOTE:

- Papillae and skeletal muscles in its three sections (longitudinal – horizontal – oblique) are the main characters of the tongue.

Dorsal surface -Filiform papilla

H.E stain



NOTES:

- Conical in shape
- The only papillae that are keratinized.

Dorsal surface - Circumvallate Papillae

H.E stain

Circumvallate Papilla

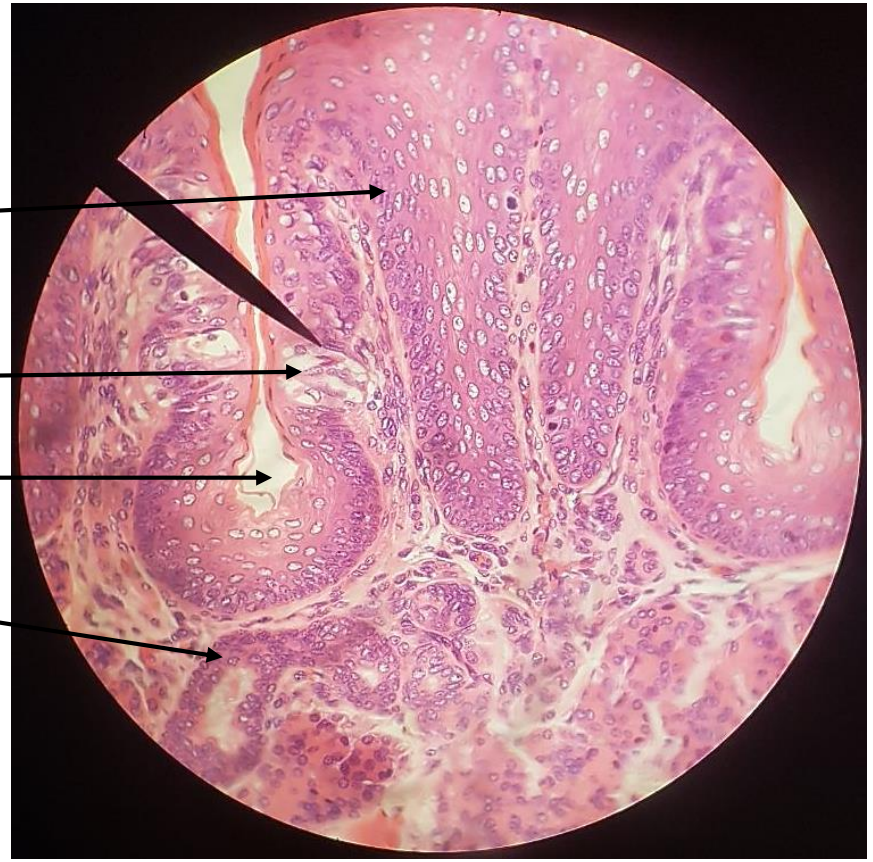
Teste bud

Furrow

Von Ebner’s gland

Skeletal muscle

H.E stain



NOTES:

- Numerous teste buds.
- Non-keratinized.
- Von Ebner's glands are found only in circumvallate papilla.

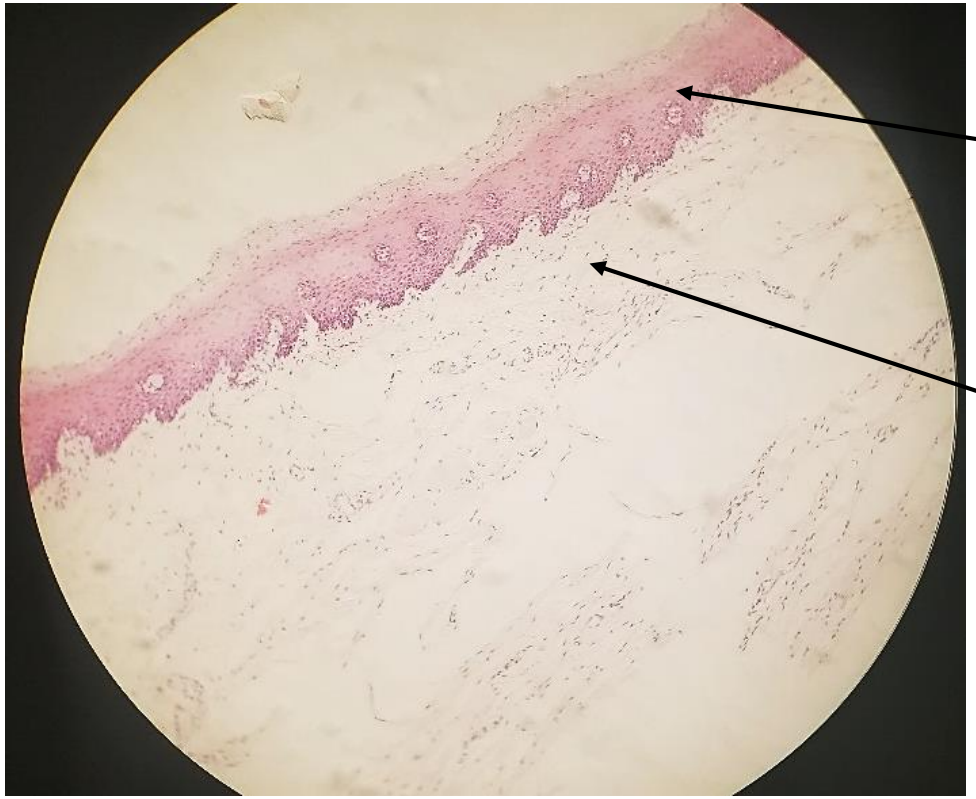
Dorsal surface – Fungiform Papillae

H.E stain

NOTE:

- Fungus shape.
- Non- keratinized.

Lower lip - Inner surface - H.E stain



Non-keratinized stratified squamous epithelium

Lamina propria

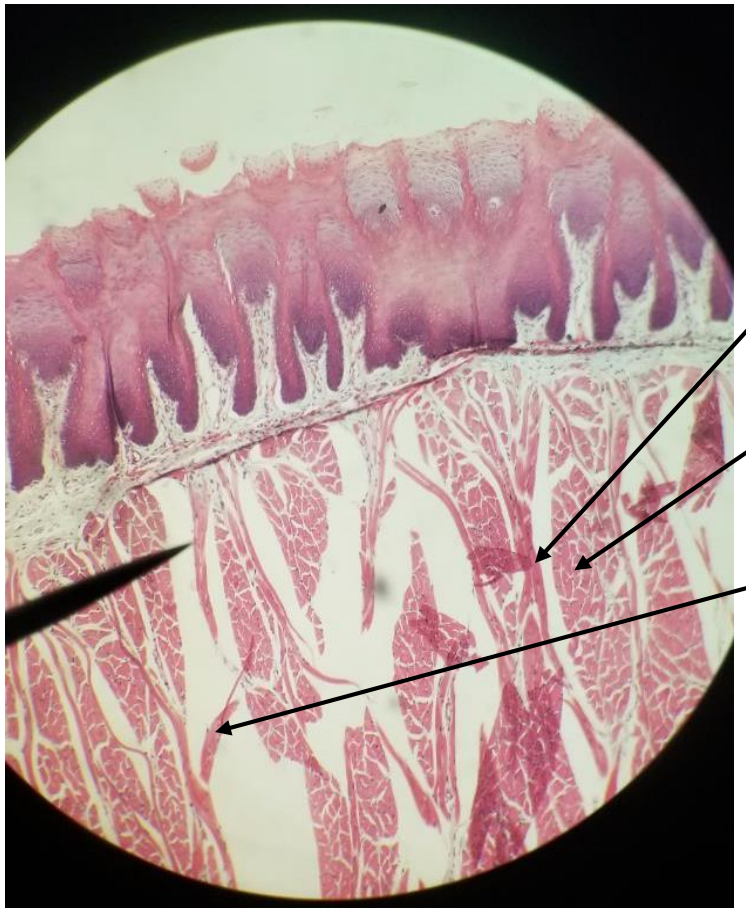
Tongue - Ventral surface – H.E stain

NOTE:

Ventral surface of tongue and inner surface of the lower lip look almost the same. So if you are asked to identify the slide the answer would be : mucosa consisting of Non-keratinized stratified squamous epithelium and lamina propria, found in Ventral surface of tongue and inner surface of the lower lip.

Sections of skeletal muscles

H.E stain

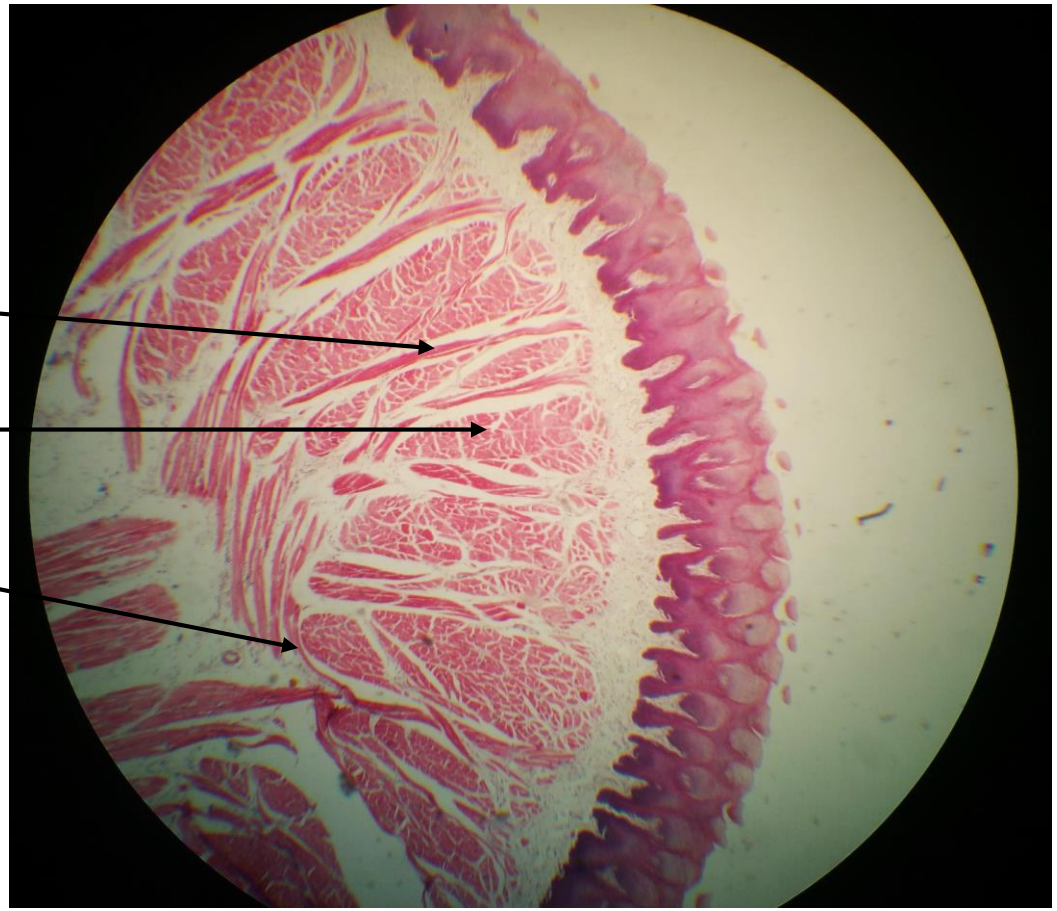


longitudinal

horizontal

oblique

H.E stain



NOTE:

- Identifying papillae in such a slide is not required.

Esophagus

New slide – H.E stain

Surface epithelium

Lamina propria

M. mucosa

Submucosa

Esophageal glands

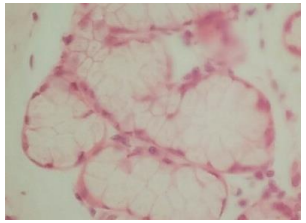
Musclosa

Old slide – H.E stain

NOTES:

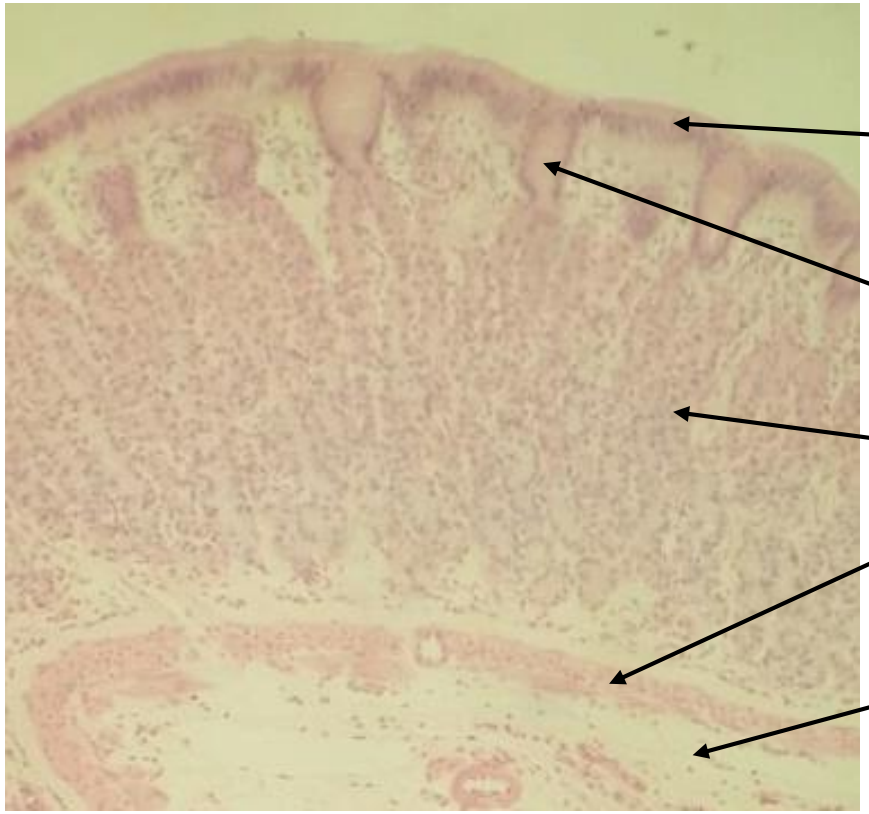
- Main characters of this slide are :
  - The mucosal epithelium is formed of stratified squamous epithelium non- keratinized.
  - Esophageal glands in submucosa.
- Esophageal glands don't really appear in the old slide.

Esophageal glands



Stomach – Fundic part

H.E stain



Simple columnar epithelium

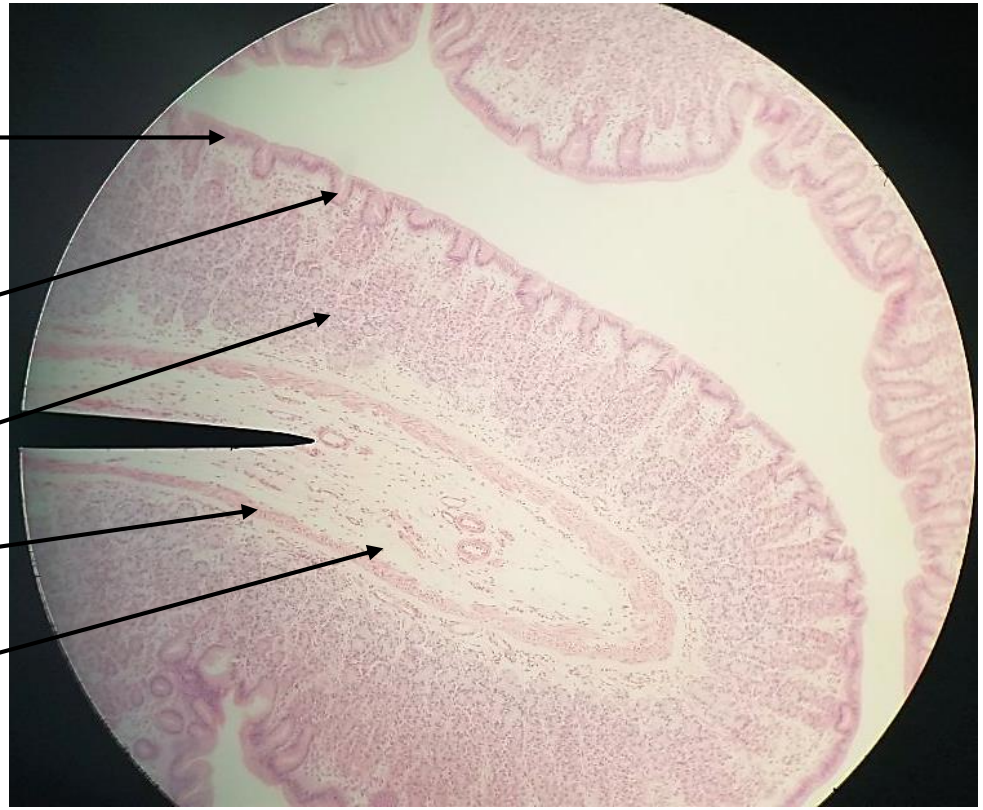
Gastric pit

Fundic glands

Muscularis mucosae

Submucosa

H.E stain



NOTES :

To identify what part of stomach is the slide we should focus on the mucosa. In fundic part it has the following characters:

- Gastric pits are short and narrow.
- numerous gastric glands in lamina propria.
- Little mucous cells.

Stomach – pyloric part

H.E stain

Gastric pit

Pyloric glands

Submucosa

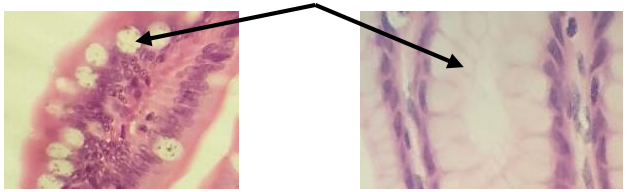
Musclosa

H.E stain

NOTES:

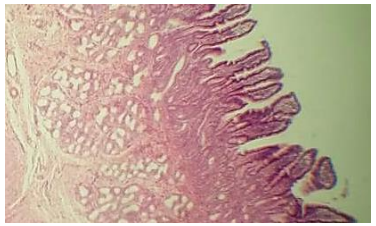
- In pyloric part it has the following characters:
  - Gastric pits are deep and wide.
  - Little gastric glands in lamina propria.
  - numerous mucous cells.
- The muscolsa layer gets thick to form the pyloric sphincter.

Mucus cell

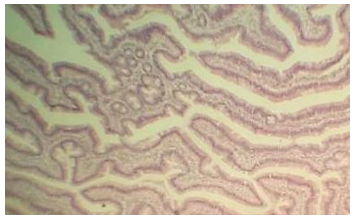


Small intestine

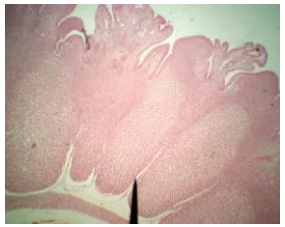
Duodenum



Jejunum



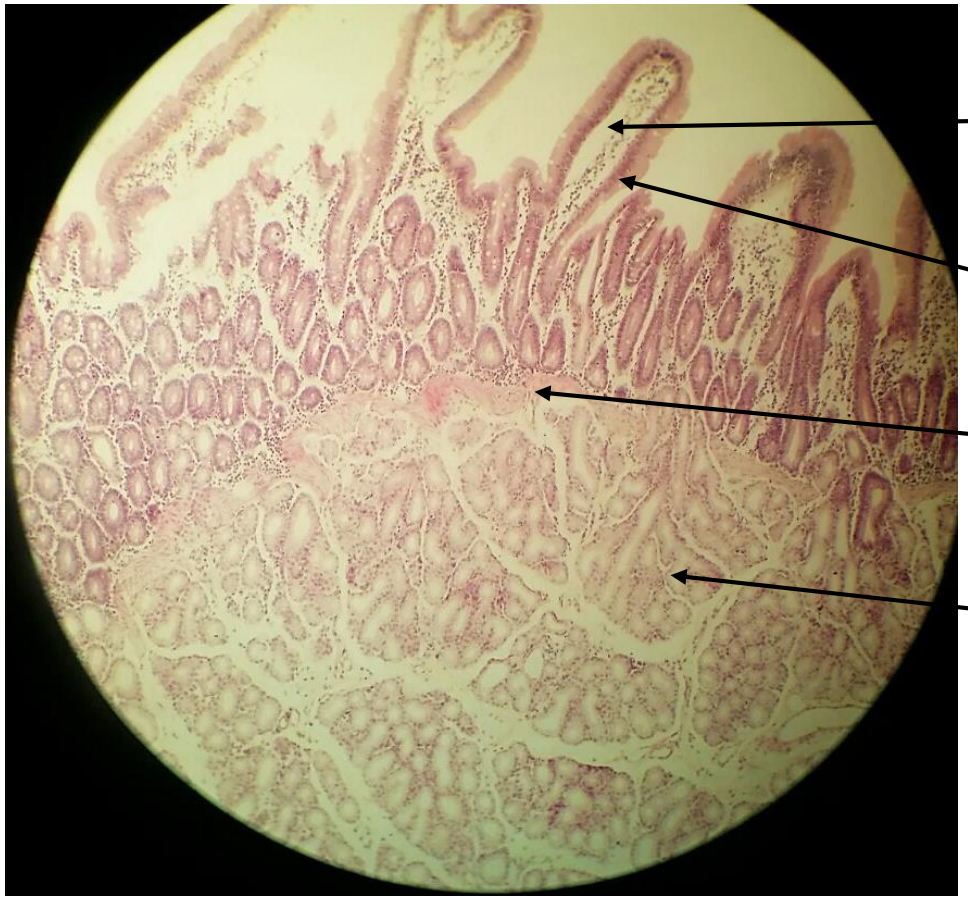
Ileum



NOTE: small intestine is characterized by villi.

Duodenum

H.E stain



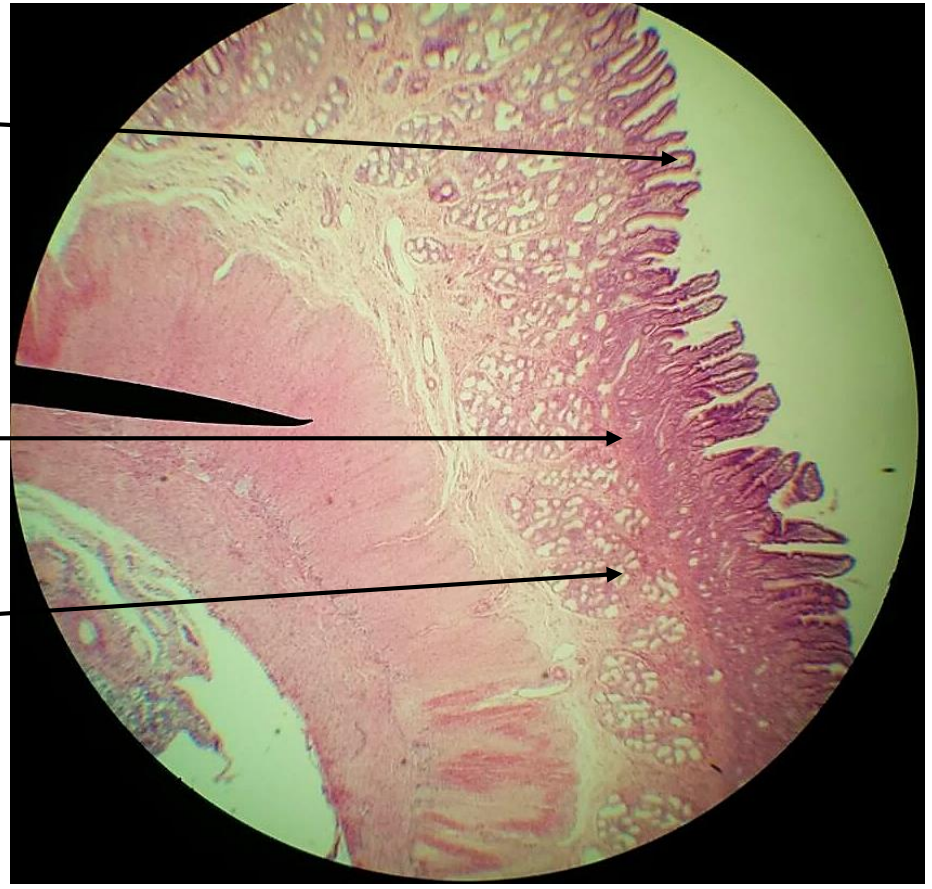
Villi

Simple columnar epithelium

Muscularis mucosae

Duodenal glands

H.E stain

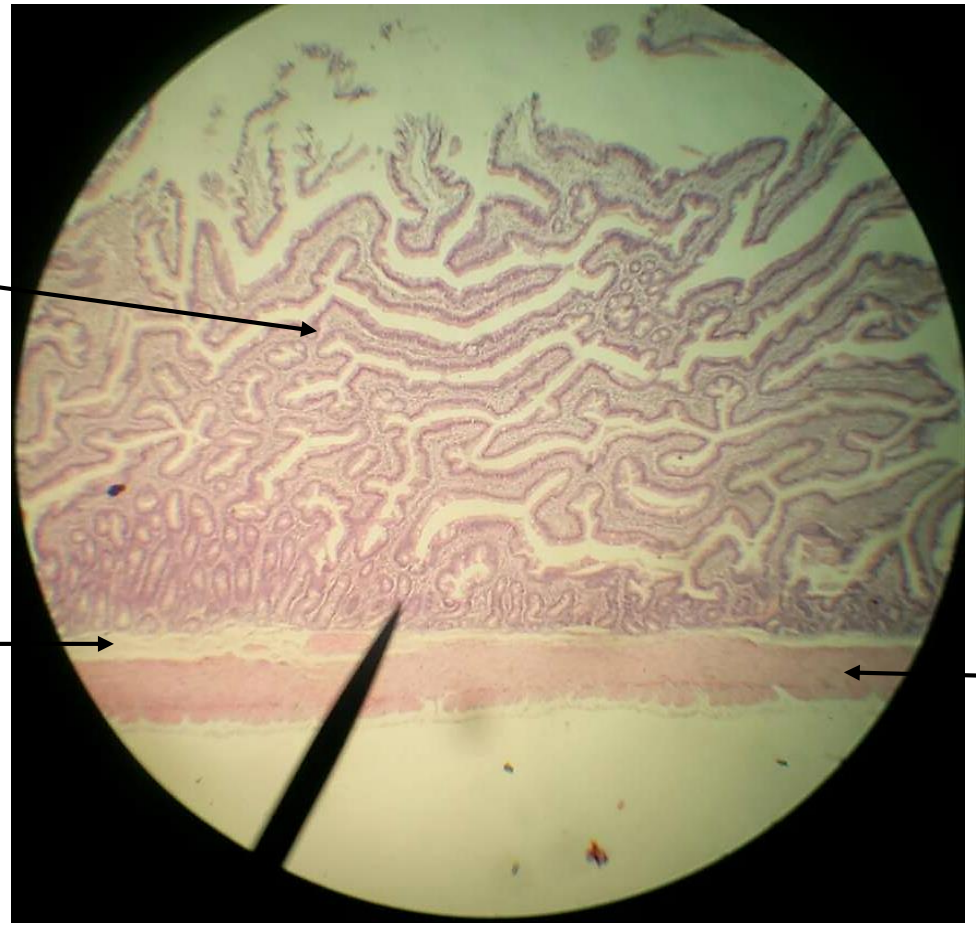


NOTES:

- Duodenal glands in submucosa (Brunner’s Gland).
- sometimes it looks like the pyloric region of stomach but in duodenum glands are in submucosa while they are in mucosa in pyloric region of stomach.

jejunum

H.E stain

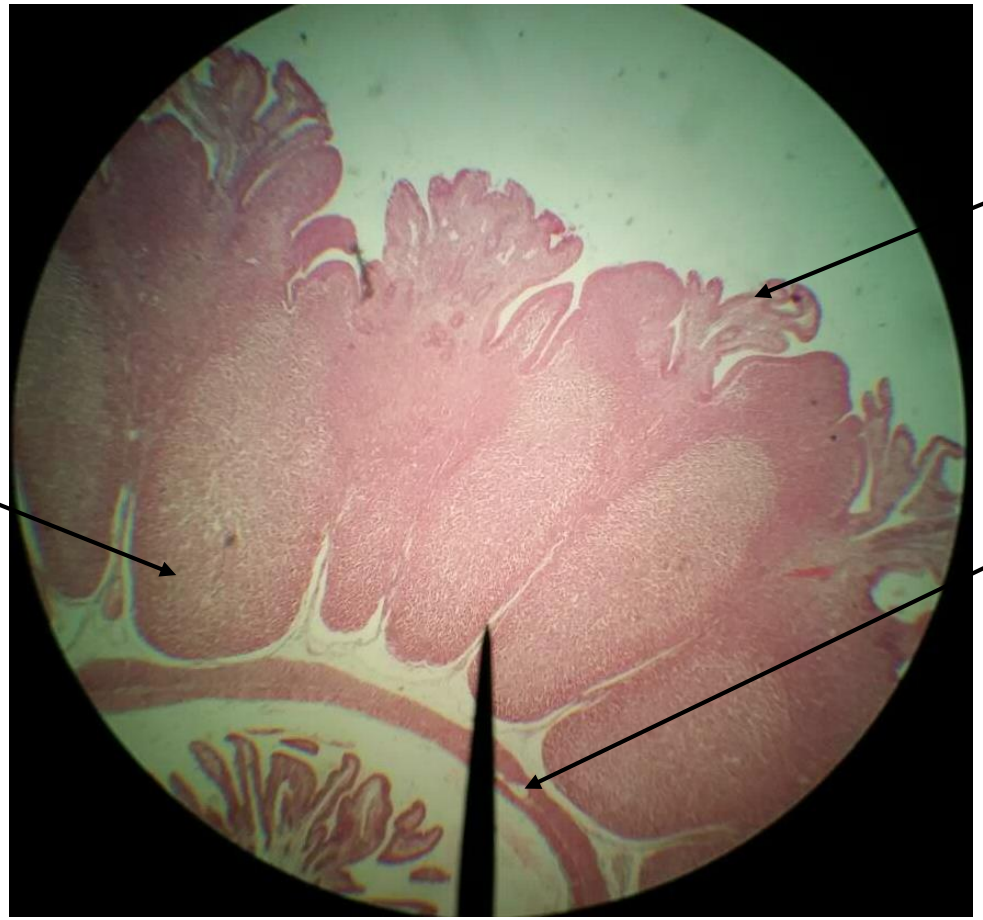


NOTES:

- villi in jejunum are long
- No glands and Peyer's patches in submucosa.

Ileum

H.E stain

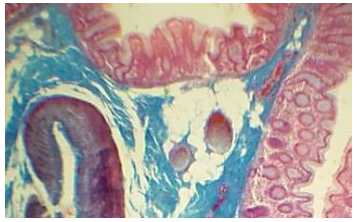


NOTES:

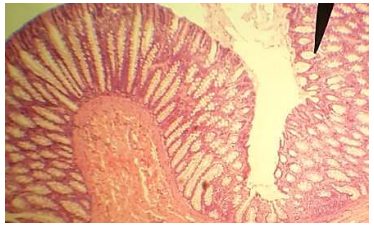
- Peyer’s patches extends from lamina propria to the submucosa.
- Small villi, but there are no villi in front of payer's patches.
- Muscularis mucosae doesn’t appear.

Large intestine

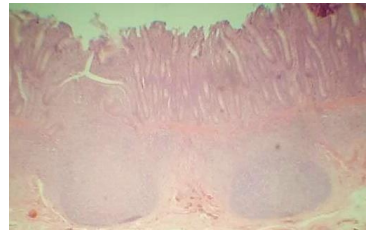
Colon



Rectum



Appendix



NOTES:

- Epithelium layer at the same level.
- No villi.

Colon

Special stain

Lining epithelium

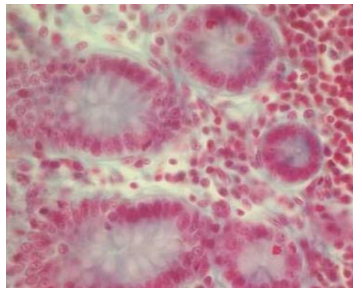
Intestinal glands

Crypt

Submucosa

Taenia coli

Intestinal glands

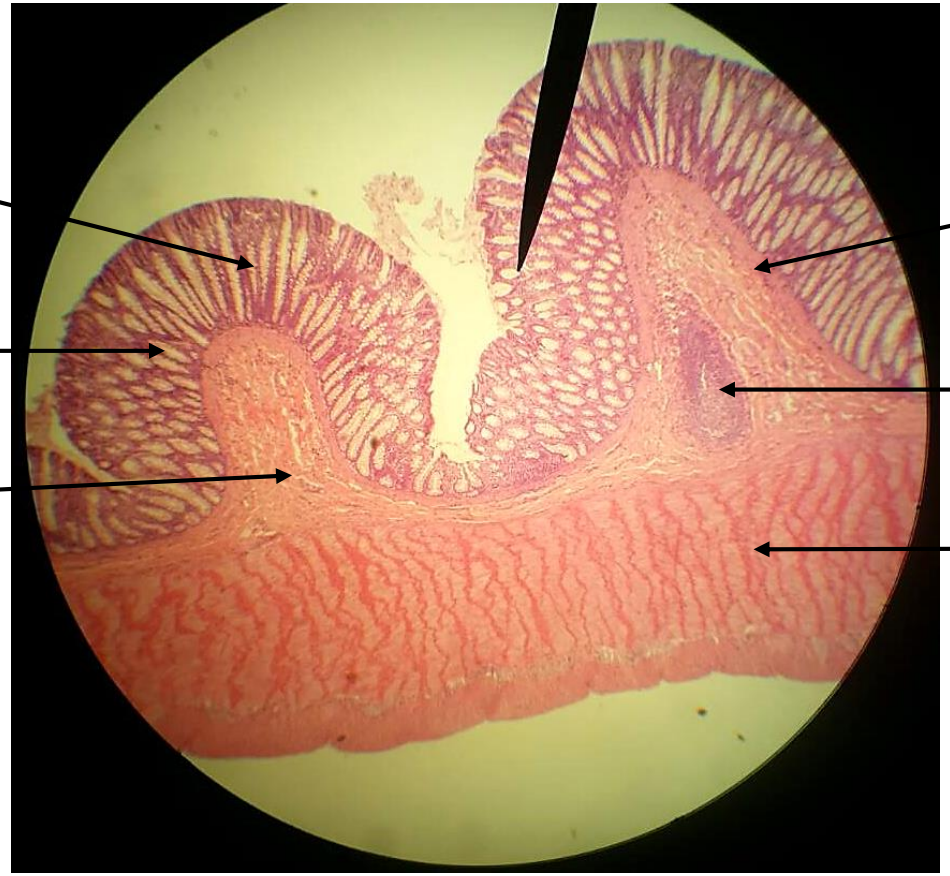


NOTES:

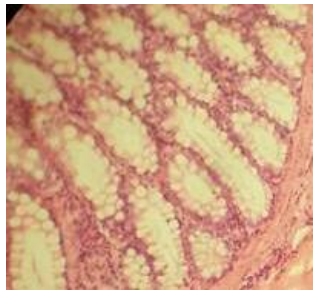
- The outer longitudinal layer isn’t continuous forming taenia coli
- Epithelium layer at the same level.
- The main character here is that the outer longitudinal muscle layer of musculosa isn't continuous forming taenia coli in some areas .
- No villi.

Rectum

H.E stain



Goblet cells

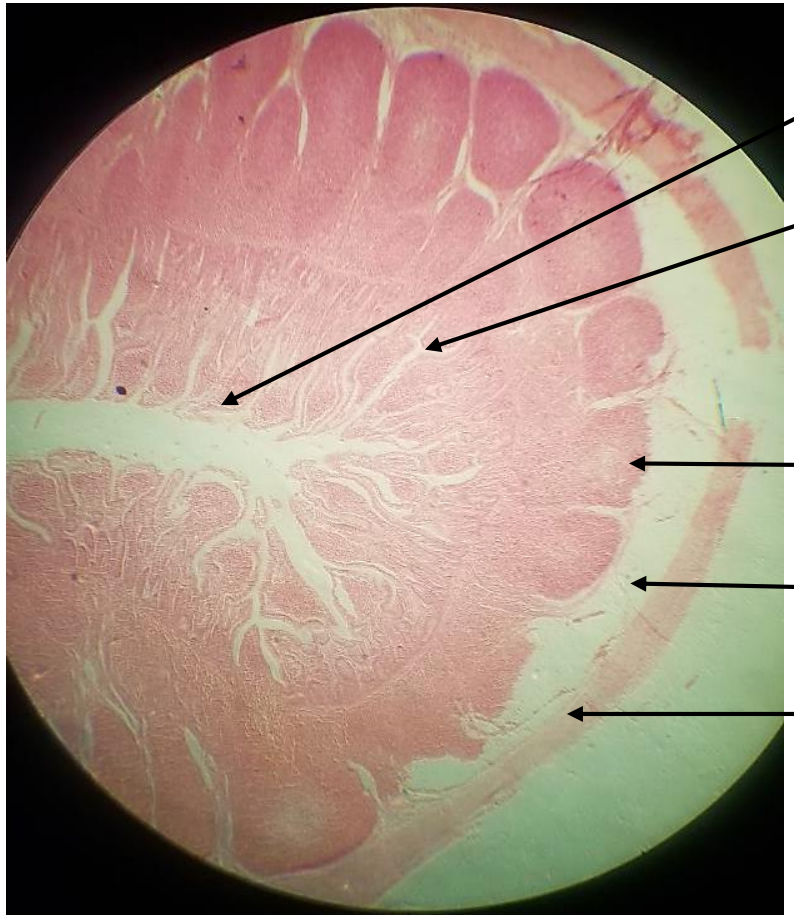


NOTES:

- Large number of goblet cells.
- Continuous longitudinal muscle layer.
- Epithelium layer at the same level.
- No villi.

Appendix

H.E stain



Lining epithelium

Crypt

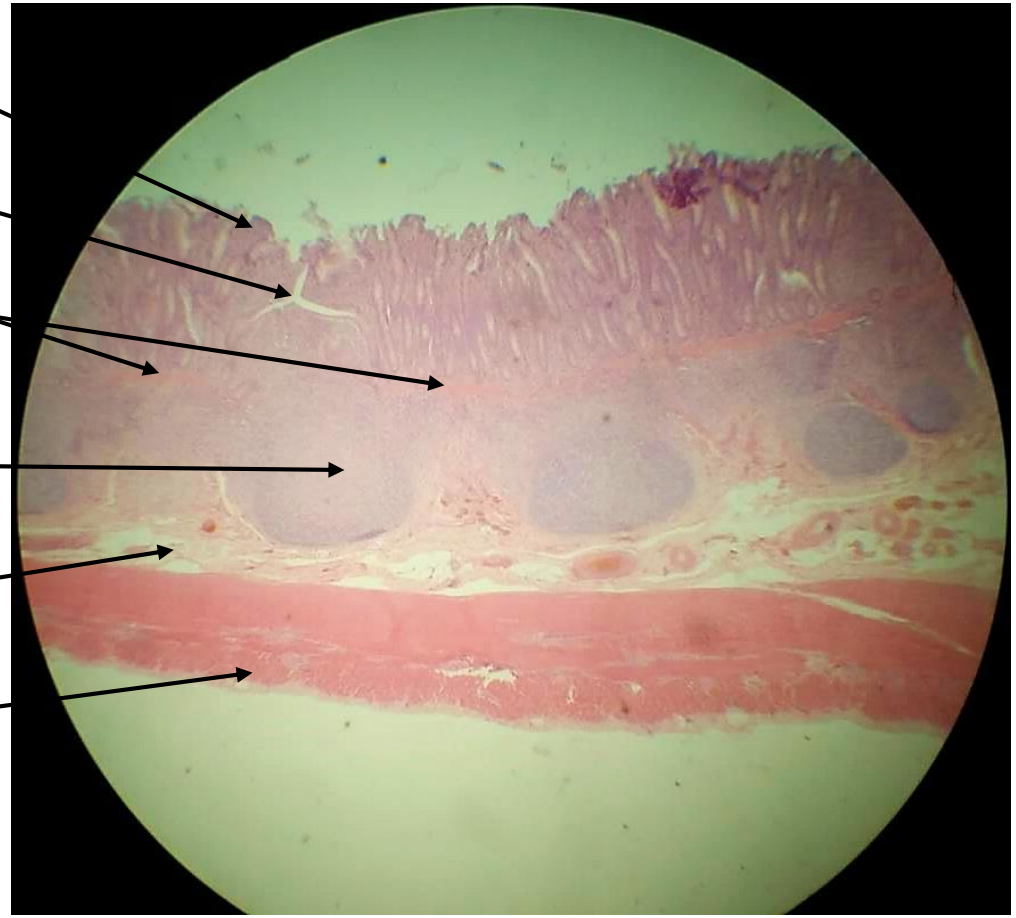
Muscularis mucosae

Lymphatic nodule

Submucosa

Musculosa

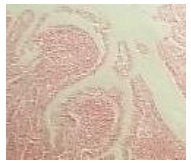
H.E stain

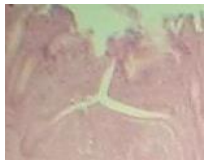


NOTES:

- Inverted Y-shape crypts.
- Discontinuous Muscularis mucosae.

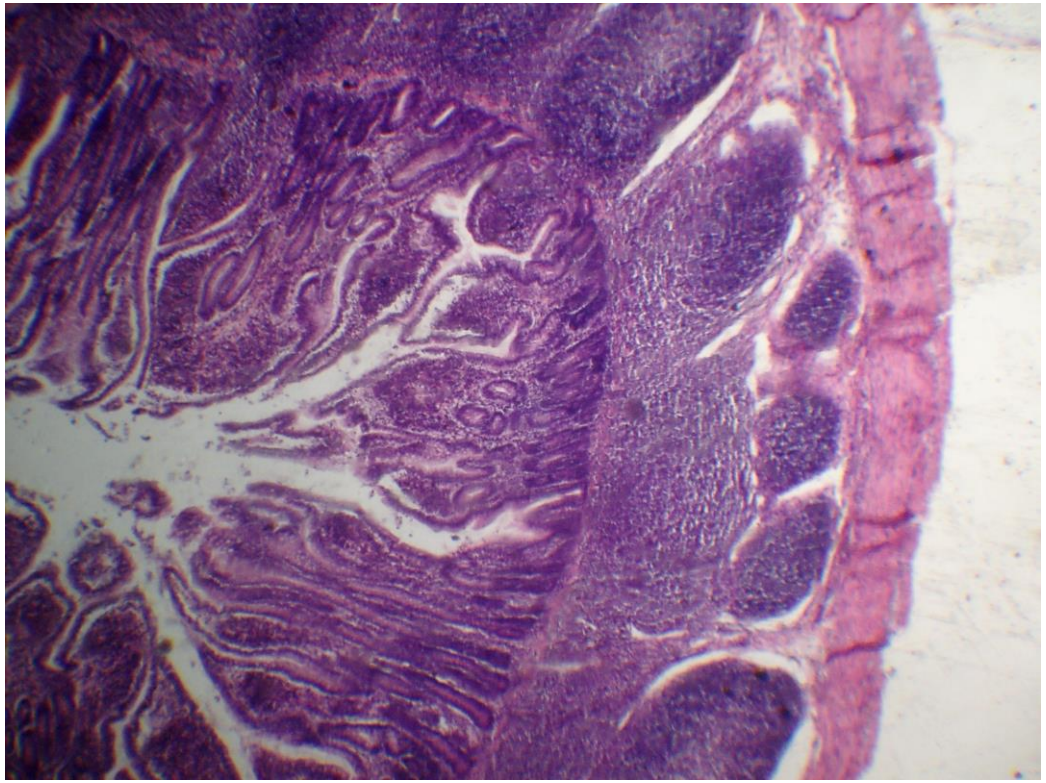
Inverted Y-shape crypts





Appendix cont.

H.E stain

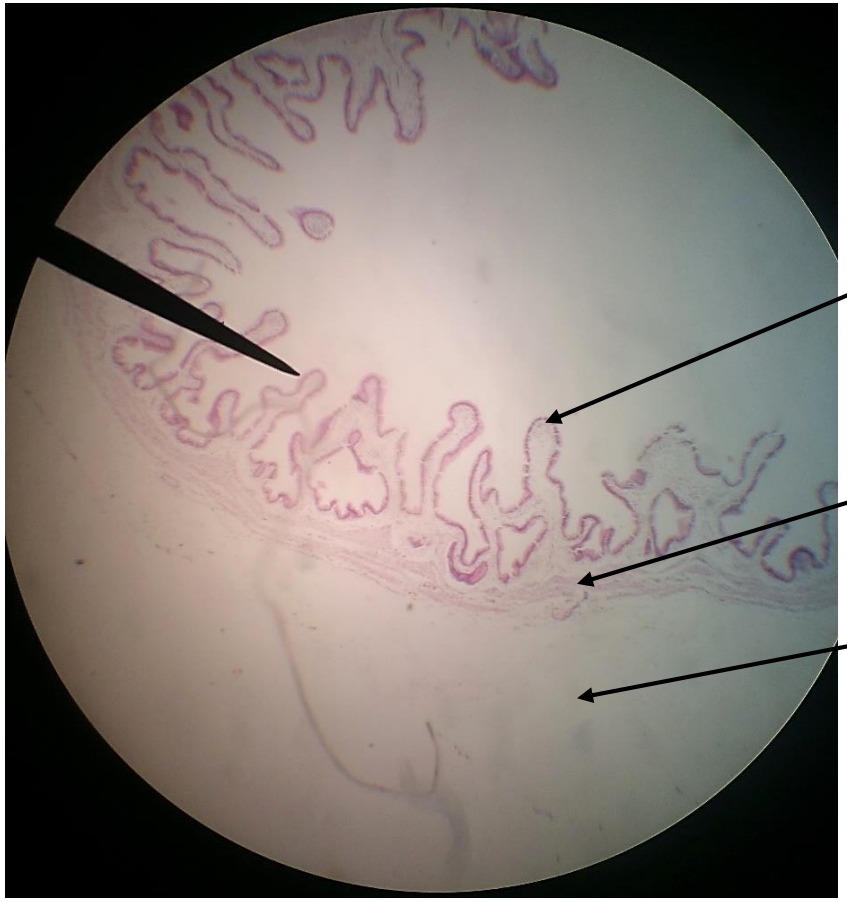


H.E stain

Ileum	Appendix
The lymph nodules of ileum (payer's patches) are antimesentric in position.	The lymph nodules surround all around the appendix .
The muscularis mucosa is absent.	The muscularis mucosa is discontinues .
Short villi	Inverted Y-shape crypts

Gall bladder

H.E stain

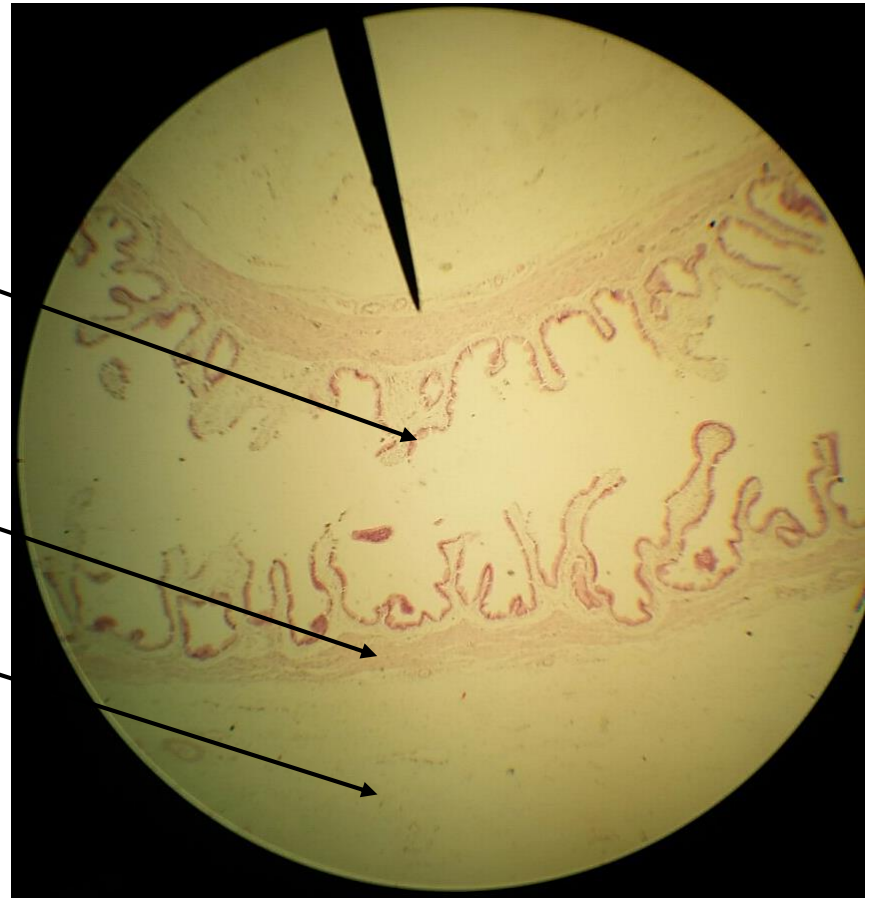


Simple columnar epithelium

Musculosa

Connective tissue

H.E stain



NOTES:

- Mucosa : highly irregularly folded mucosa with no goblet cells Highly folded mucosa (no villi – no crypt)
- Lamina properia: no glands , no crypts and no muscularis mucosa.
- No submucosa.
- Musculosa: just one layer of smooth muscle.

Pancreas

H.E stain

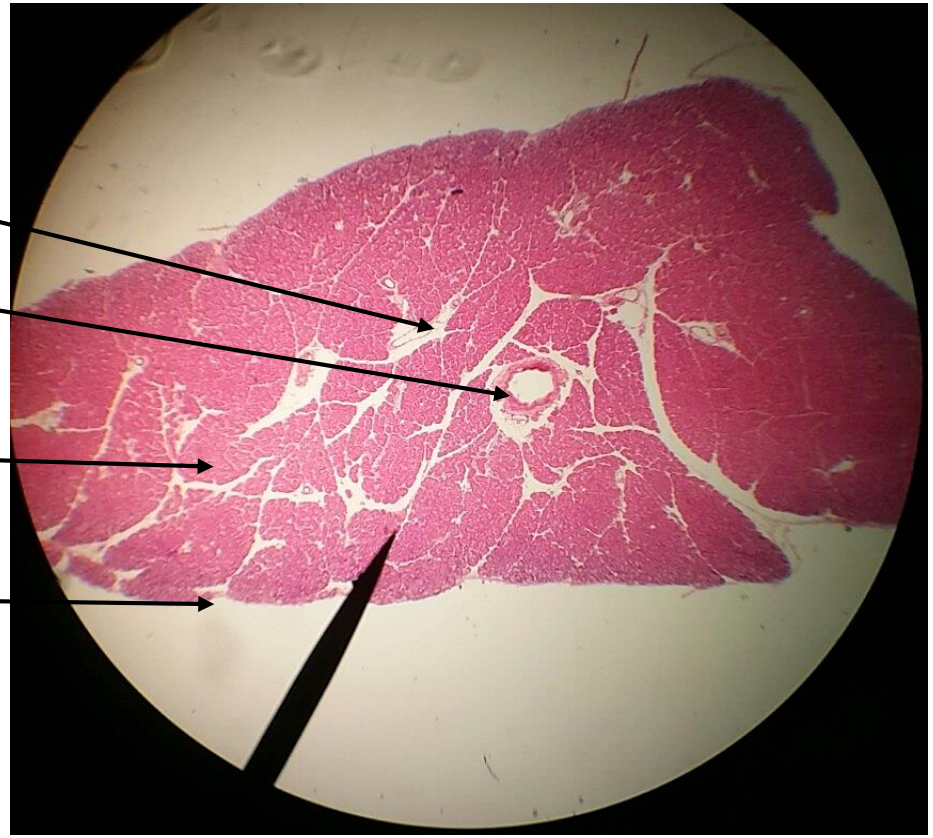
Trabecula

Pancreatic duct

Pancreatic acini

Capsule

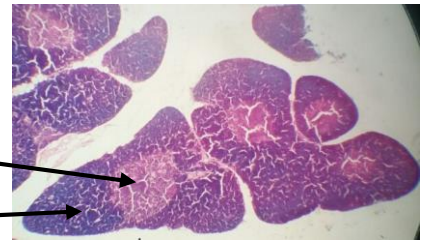
H.E stain



NOTES:

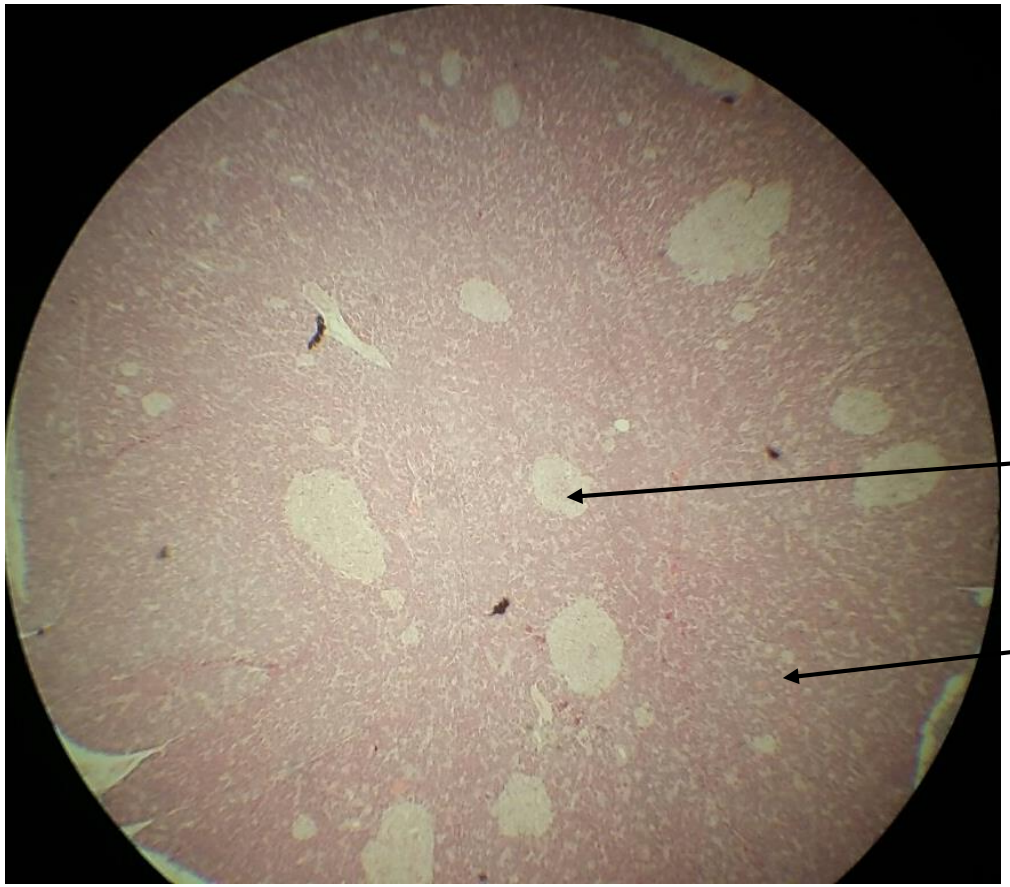
- Pancreas is formed of stroma and parenchyma.
- Pancreas may appear like thymus but in thymus there are cortex and medulla with there while there are not here.

Thymus with :
Medulla
Cortex

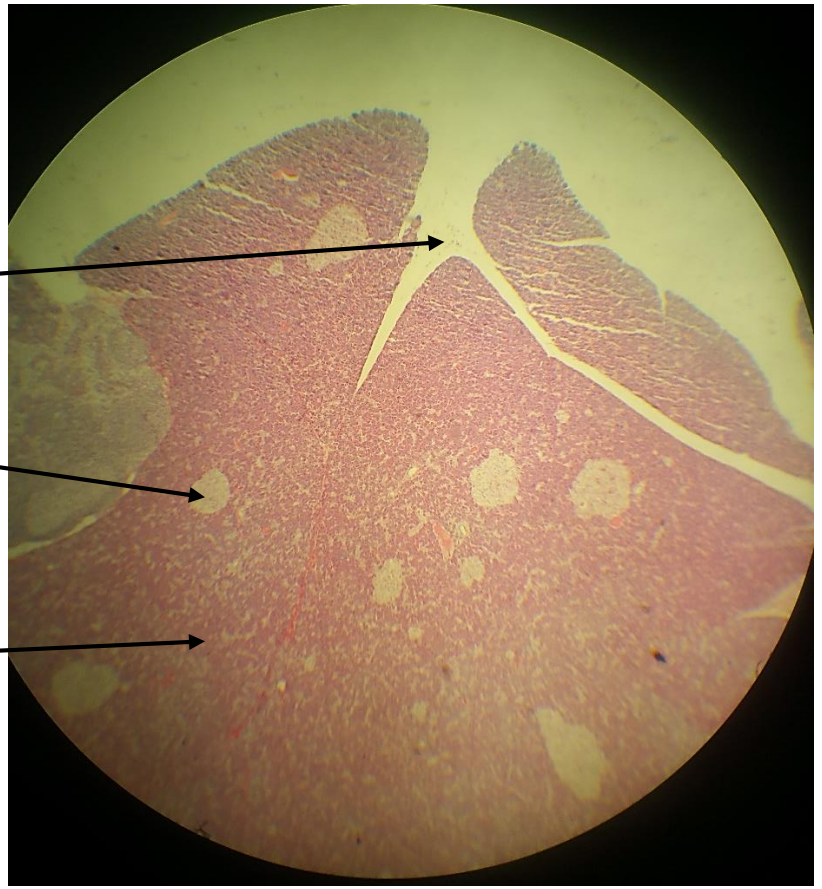


Pancreas cont.

Special stain



Special stain



Trabecula

Islets of Langerhans

Pancreatic acini

NOTES:

- We use special stain to see islets of Langerhans.
- Trabeculae are not clear with special stain.
- Islets of Langerhans are distributed between the pancreatic acini.

Liver

H.E stain

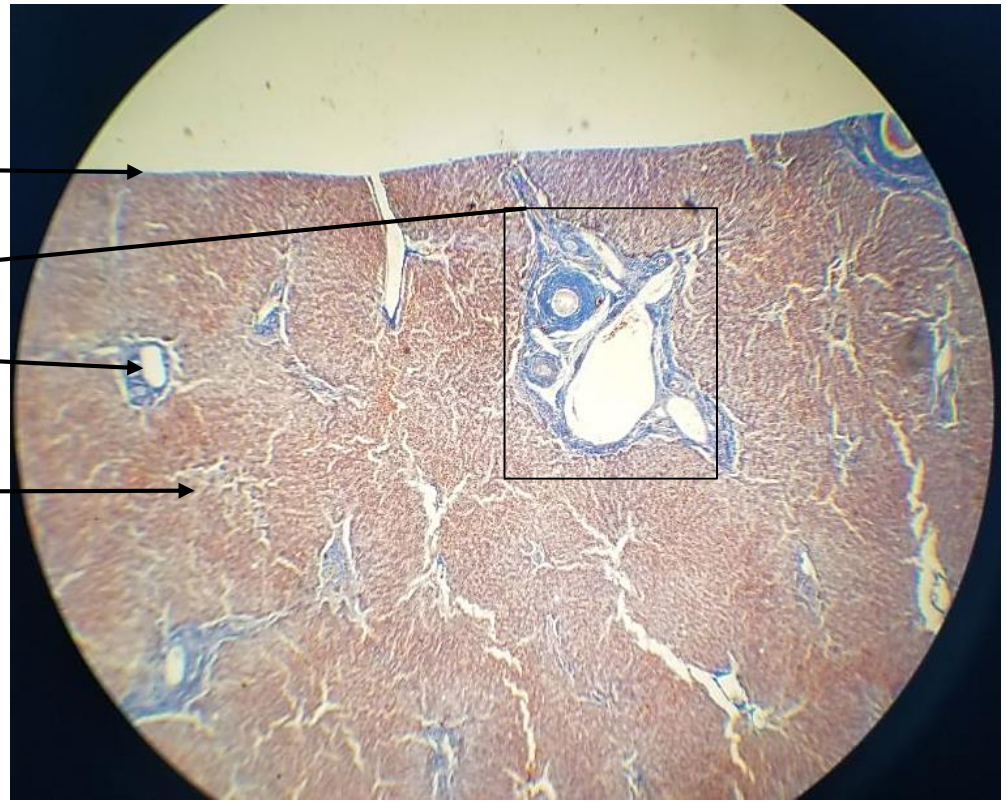
Capsule

Portal triad

Central vein

Hepatocytes

Special stain

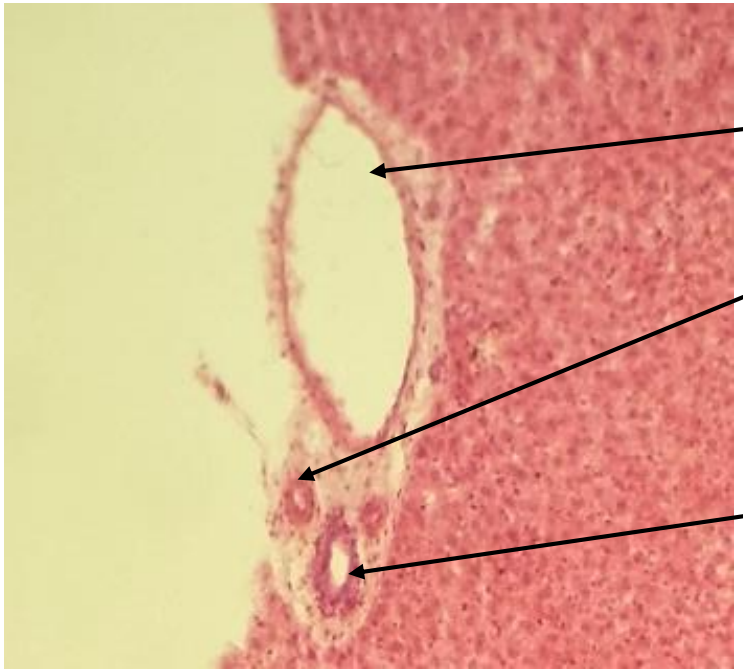


NOTES:

- Portal area is a connective tissue consisting portal triad (portal artery, portal vein and bile duct). Sometime we see just two of the three structures.
- We may see blood in the central vein.
- Hepatic lobules don't appear.

Liver cont.

Portal triad – H.E stain

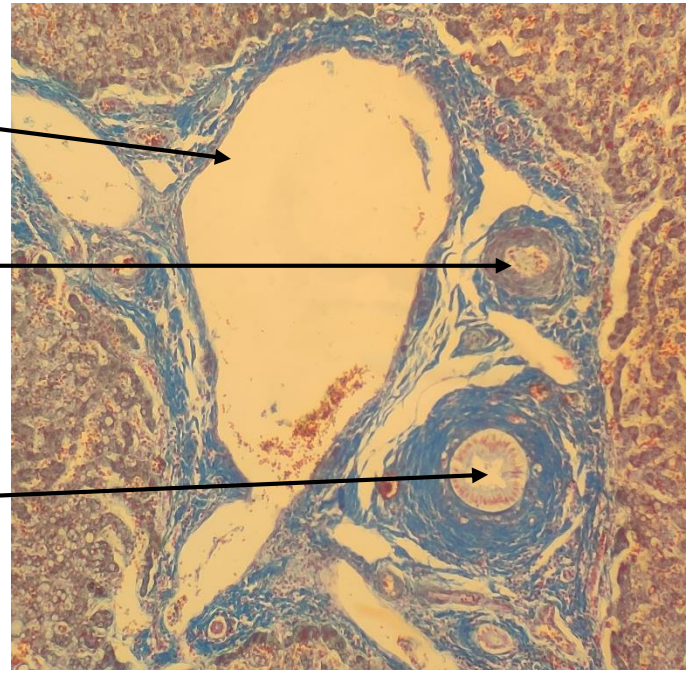


Portal vein

Portal artery

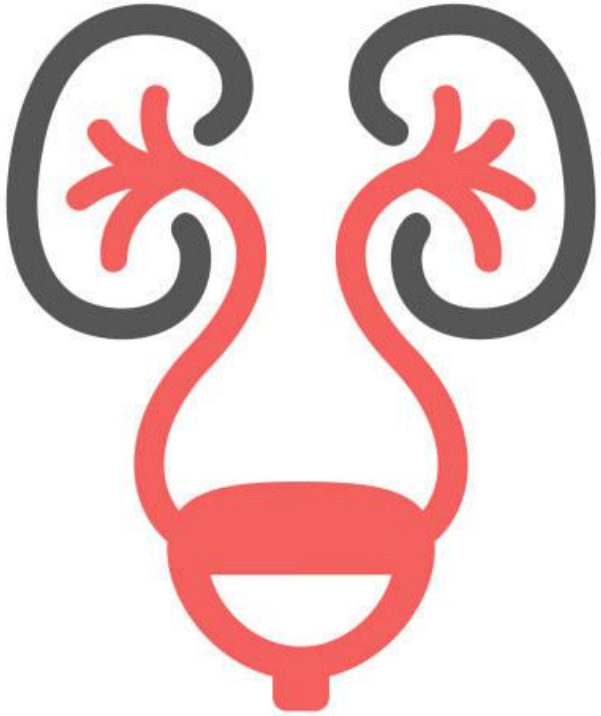
Bile duct (not really clear)

Portal triad – special stain



NOTES:

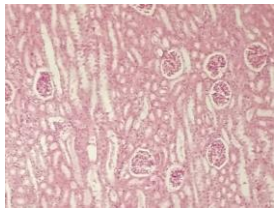
- Portal vein is lined by simple squamous and irregular in shape (wide lumen).
- Portal artery lined by simple squamous and regular in shape (narrow lumen).
- Bile duct is lined by simple cuboidal.

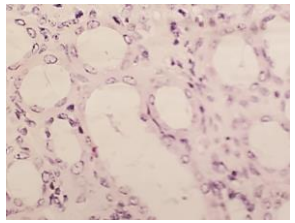


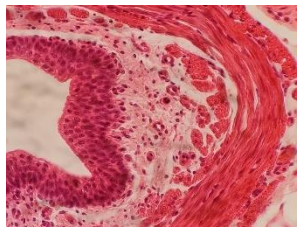
URINARY SYSTEM

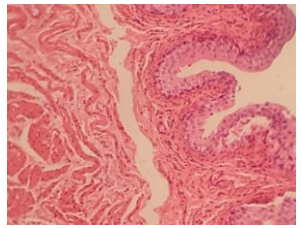
Urinary system

- Kidney
  - cortex
  - Medulla
- Ureter
- Urinary bladder



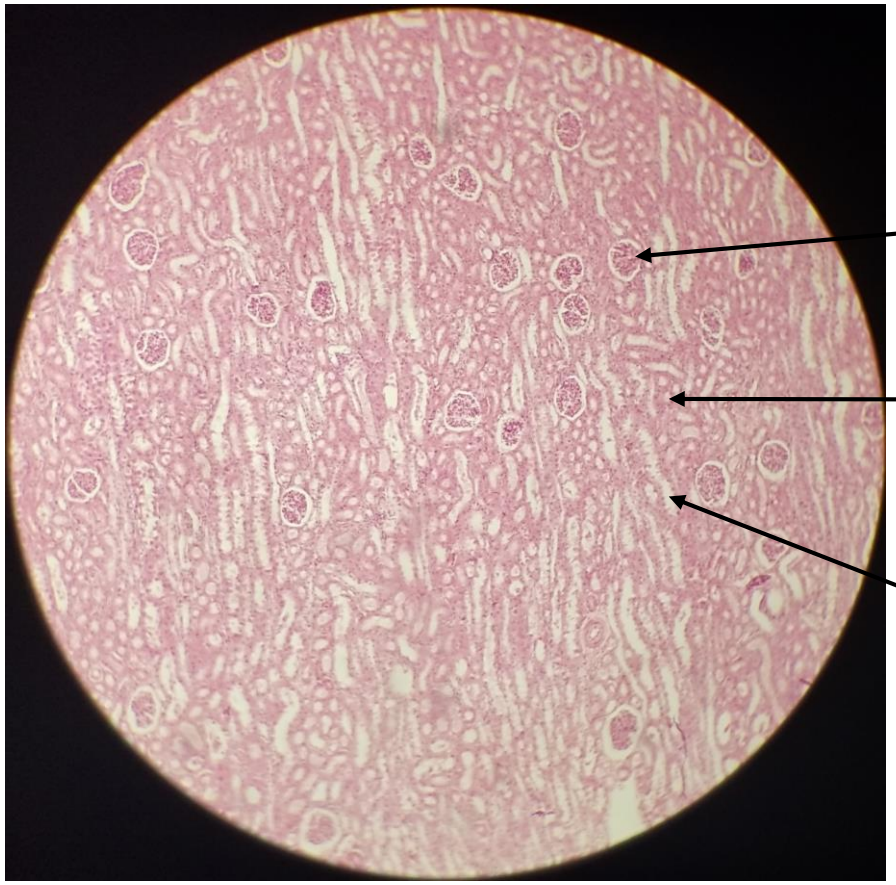






cortex

H.E stain



glomerulus

Proximal Convoluted Tubules

Distal Convoluted Tubules

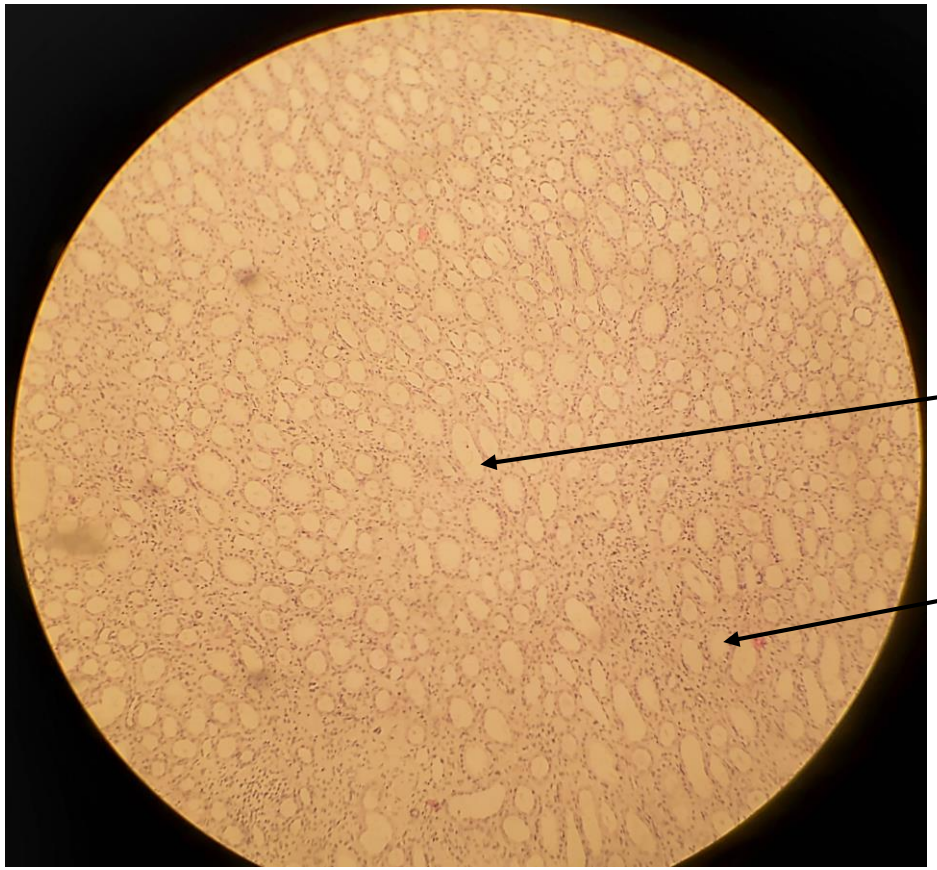
H.E stain

NOTES:

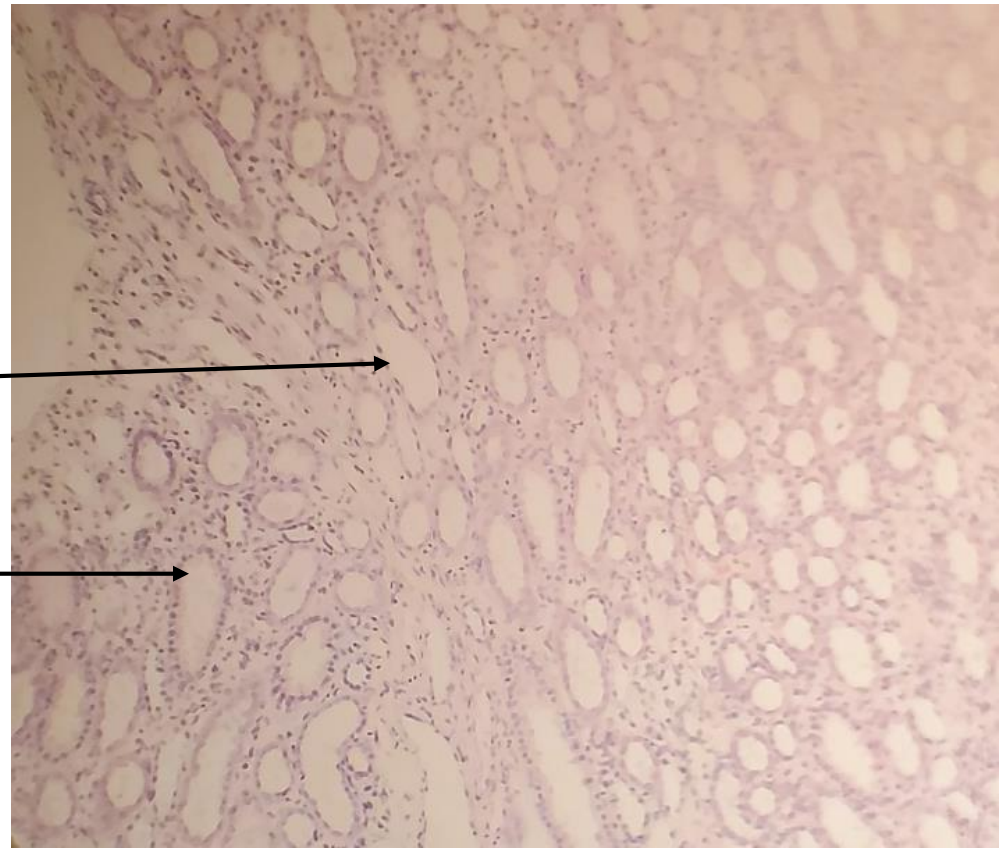
- Cortex is the outer part of kidney.
- Glomerulus is the most clear character of the slide.
- Proximal convoluted tubules have less cells and narrow lumen
- Distal Convoluted tubules have more cells and wide lumen.

Medulla

H.E stain



H.E stain

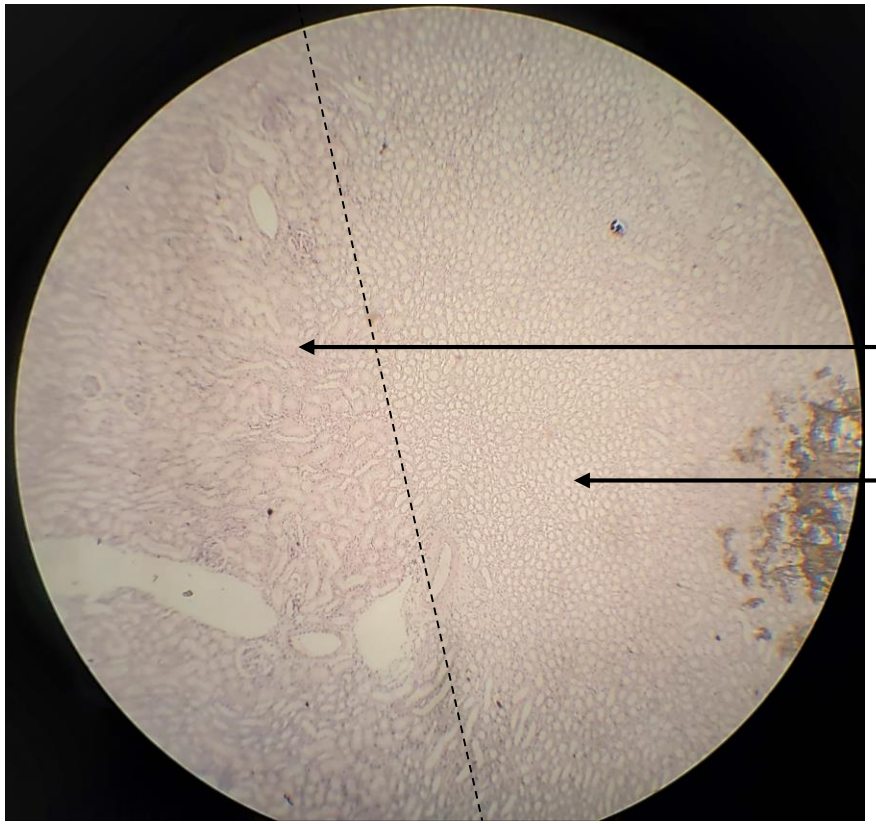


NOTES:

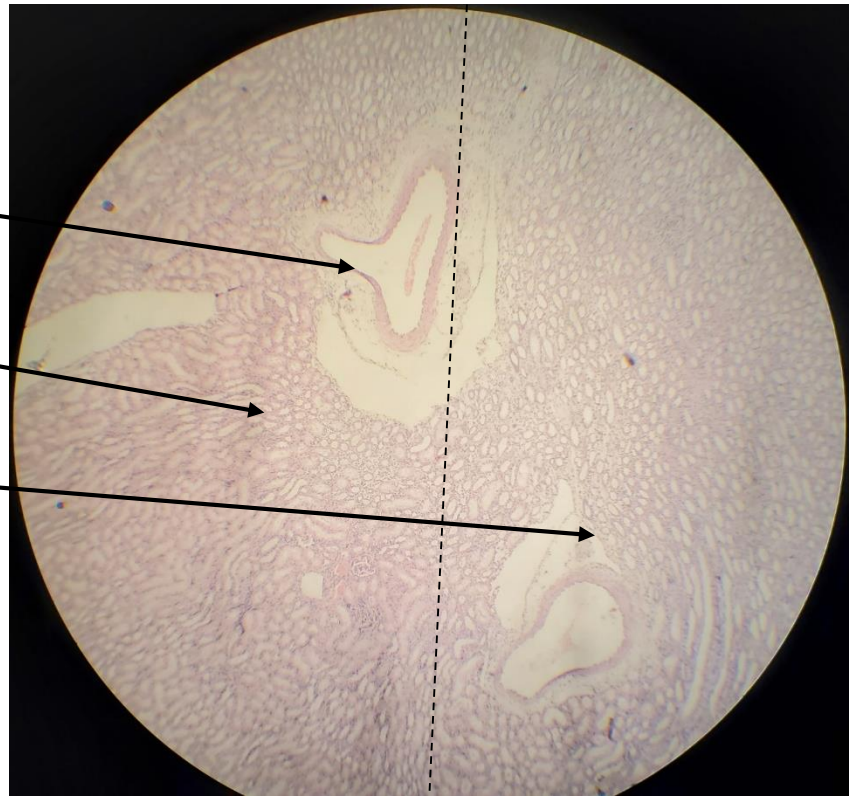
- Medulla is the inner part of kidney.
- No glomerulus
- Most tubules are the collecting ducts which are lined by simple cuboidal cells
- Loop of Henle is lined by simple squamous epithelium.

Corticomedullary junction

H.E stain

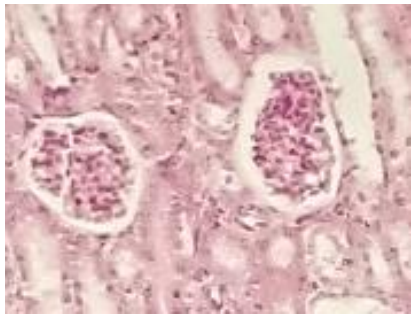


H.E stain

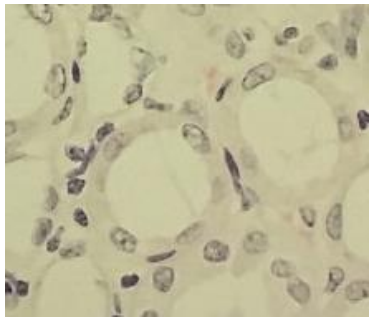


NOTE:

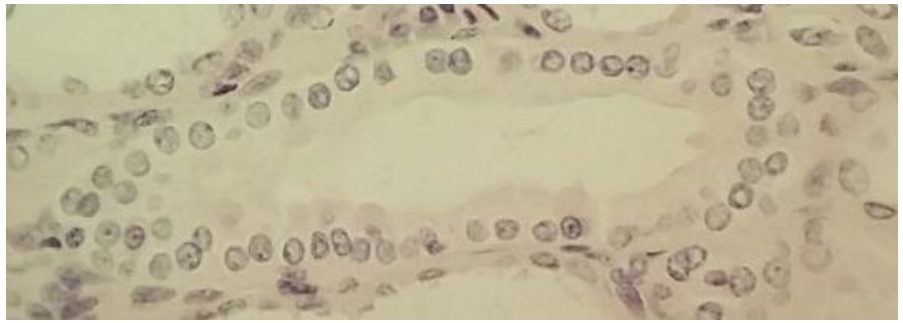
- Arcuate artery is found at the junction between cortex and medulla.



glomerulus

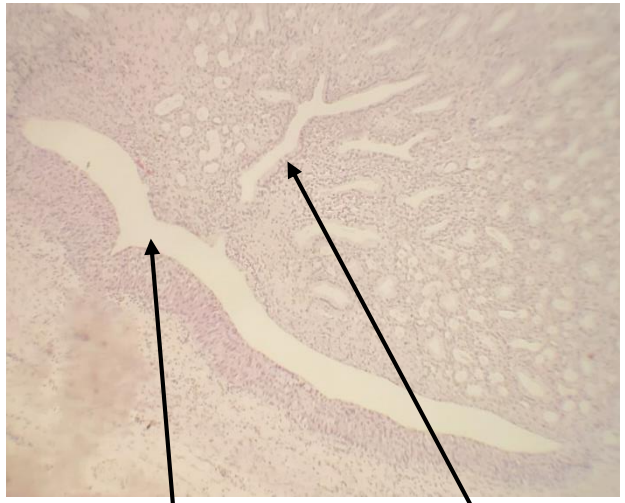


Proximal Convoluted Tubules



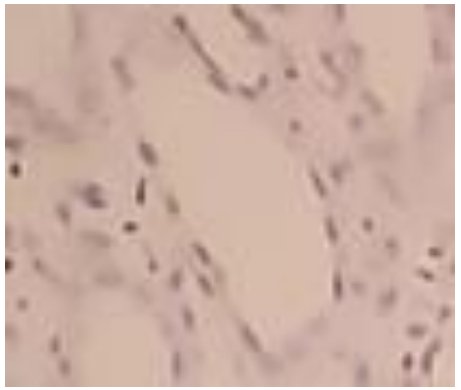
Collecting duct

Arcuate artery

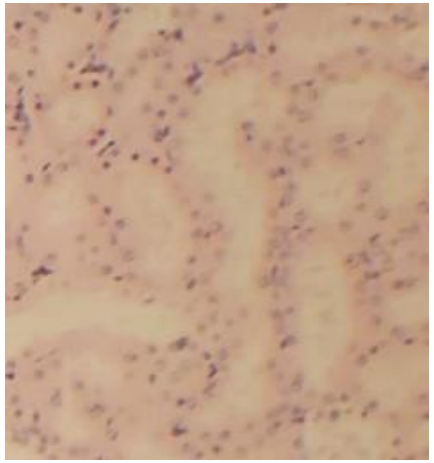


Major calyx
Large - no branches

Minor calyx
Small - Branched



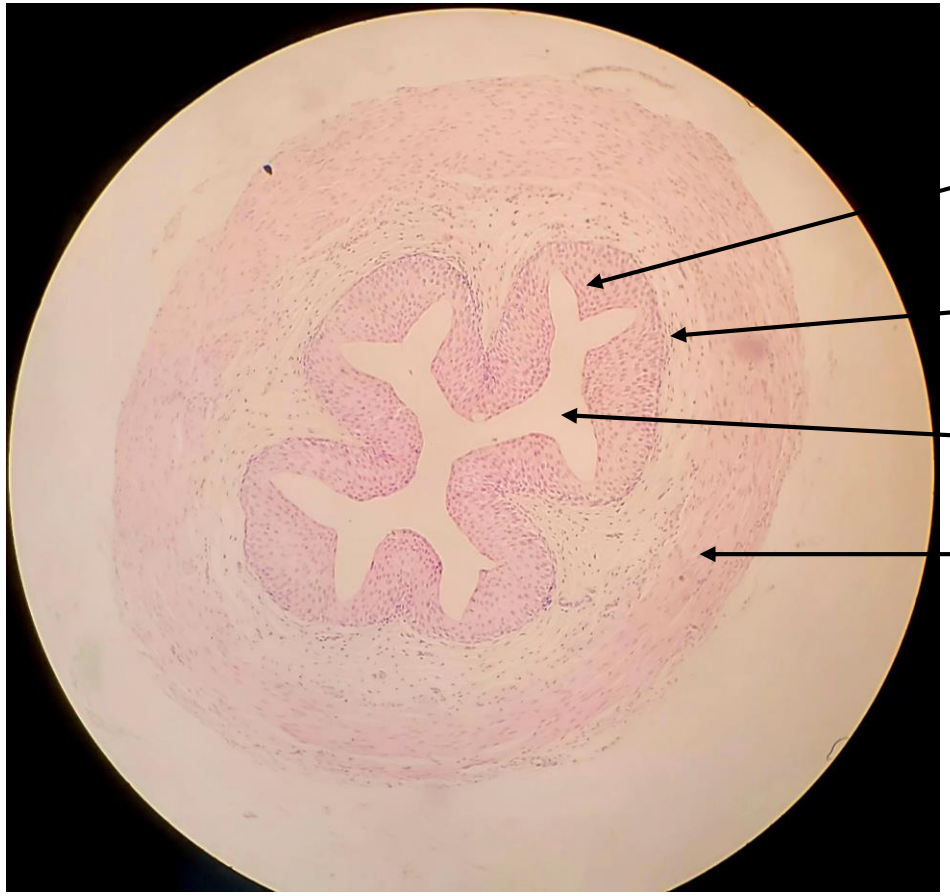
loop of Henle

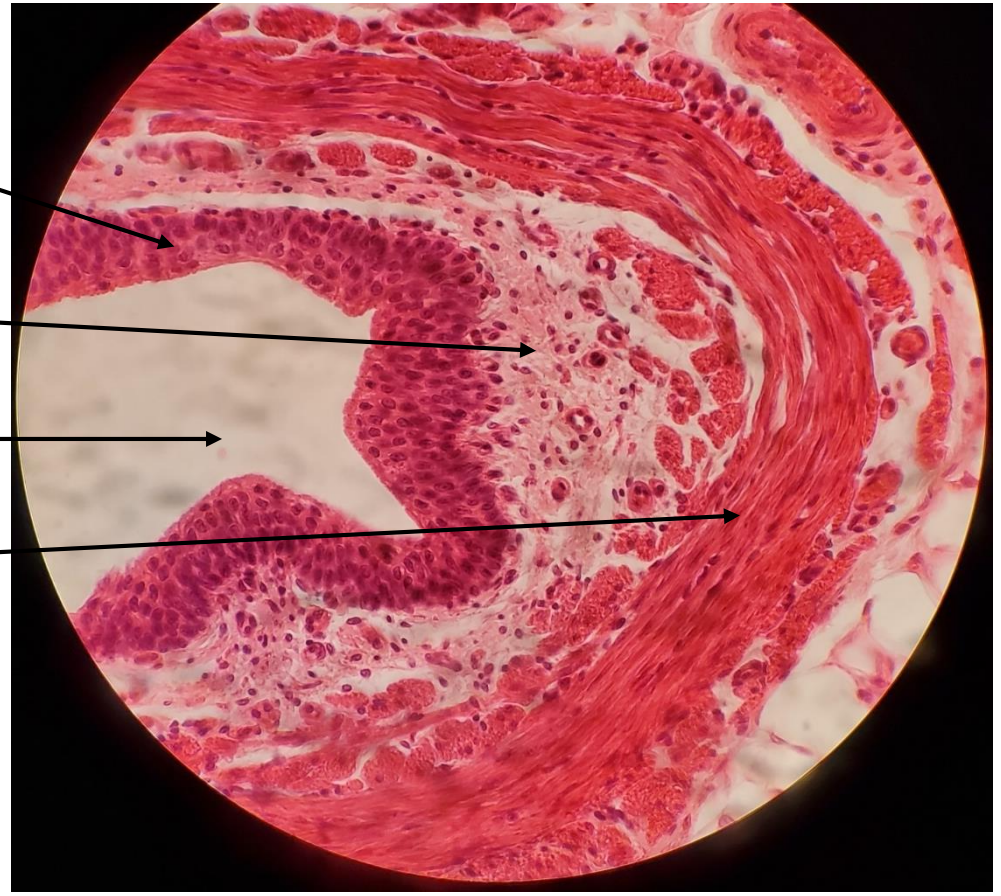


Distal Convoluted Tubules

Ureter

H.E stain





H.E stain

NOTES:

- The main structure is like GIT but the mucosa is transitional epithelium and without submucosa.
- less folding than the urinary bladder.
- Narrow star-shape lumen (when empty).
- The musculosa consists of two layers of muscles inner longitudinal & outer circular , but they appear sometimes as a one mass of muscle with regular arrangement .

Urinary bladder

H.E stain

H.E stain

lumen

Transitional epithelium

Lamina propria

Musculosa

NOTES:

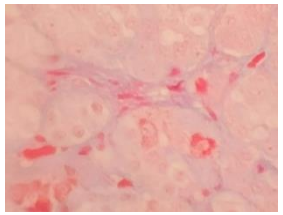
- The main structure is like GIT but the mucosa is transitional epithelium and without submucosa.
- More folding than the ureter.
- Wide lumen.
- Musculosa consists of three layers and they randomly arranged.

ENDOCRINE SYSTEM

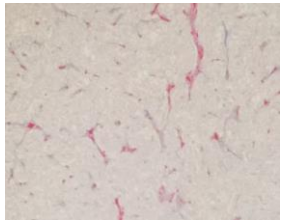
Endocrine system

Pituitary gland

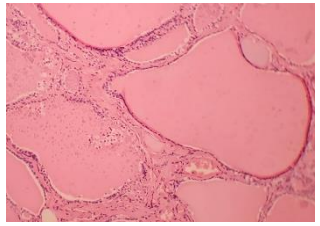
Ant. lobe



Post. lobe

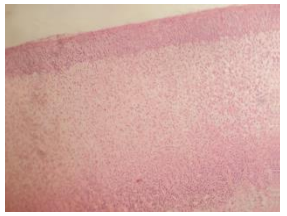


Thyroid gland

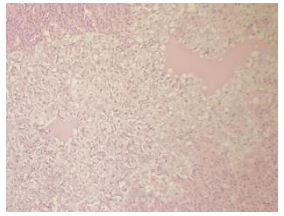


Suprarenal gland

Cortex



medulla

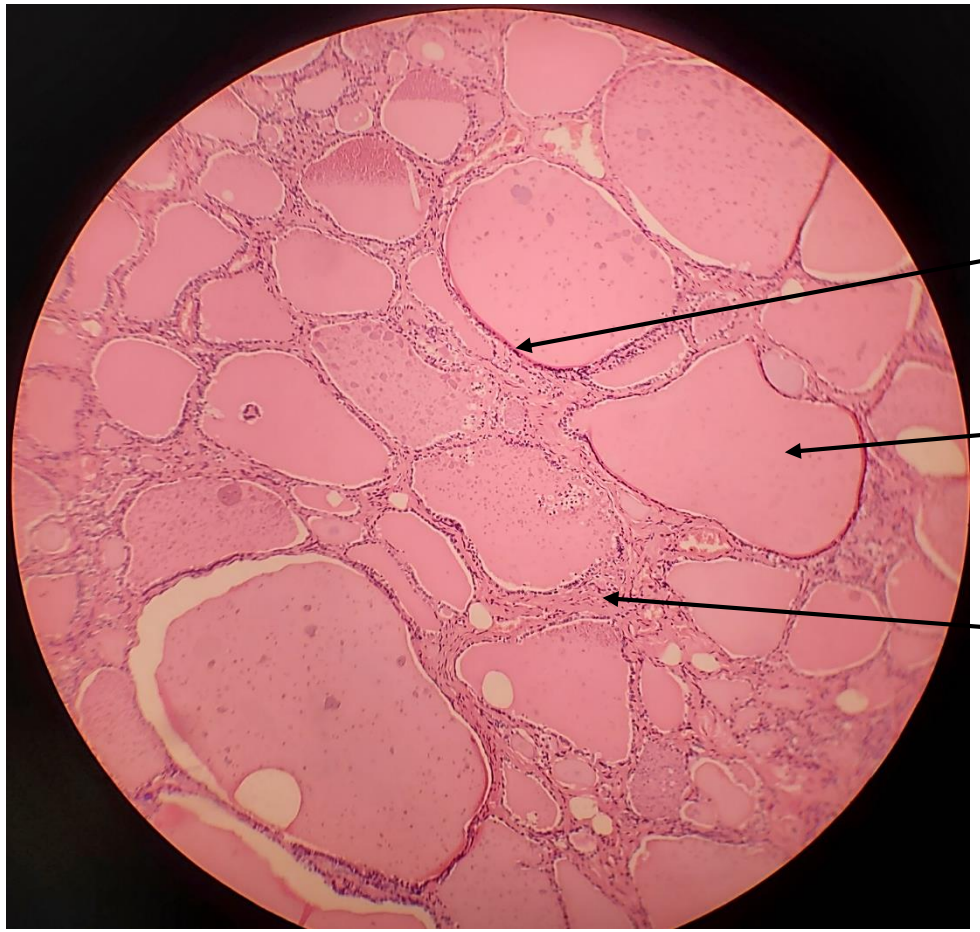


NOTE:
Glands in General Contain :
- Stroma : Capsule - Trabecula - Reticular tissue
- Parenchyma : Cortex is peripheral and dark .Medulla is central and pale.

Except thyroid gland which has no cortex and medulla.

Thyroid gland

H.E stain

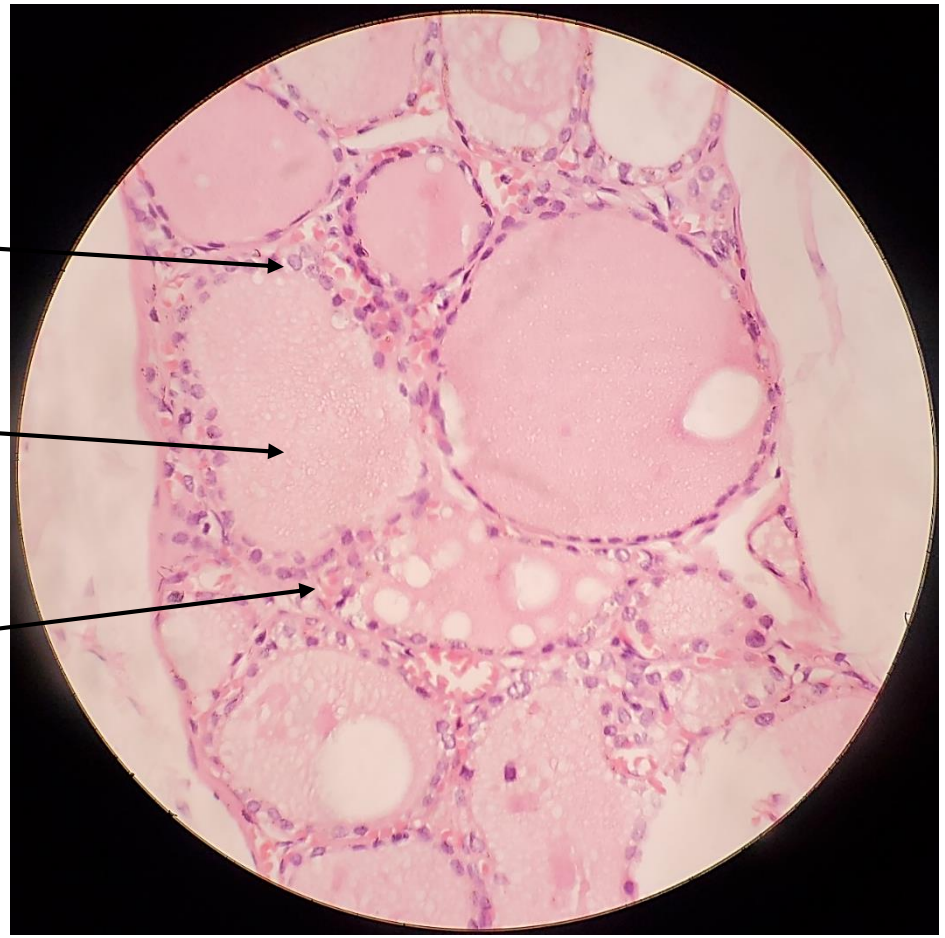


simple cuboidal epithelium

colloid

connective tissue

H.E stain

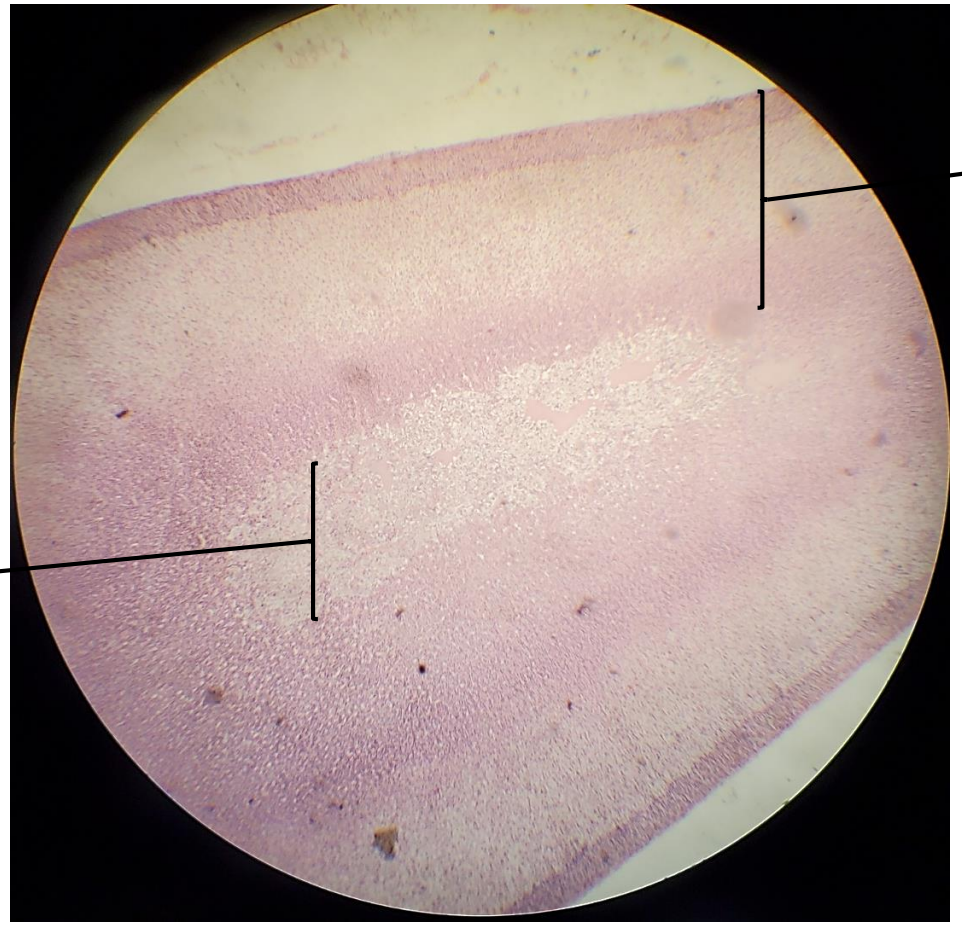


NOTES:

- Parenchyma has no cortex and no medulla.
- Thyroid Follicles are lined by simple cuboidal epithelium and their lumen is filled with colloid.
- There is a connective tissue between the follicles which called septa or trabecula.
- Parafollicular cells don’t appear in those slides

Suprarenal gland

H.E stain

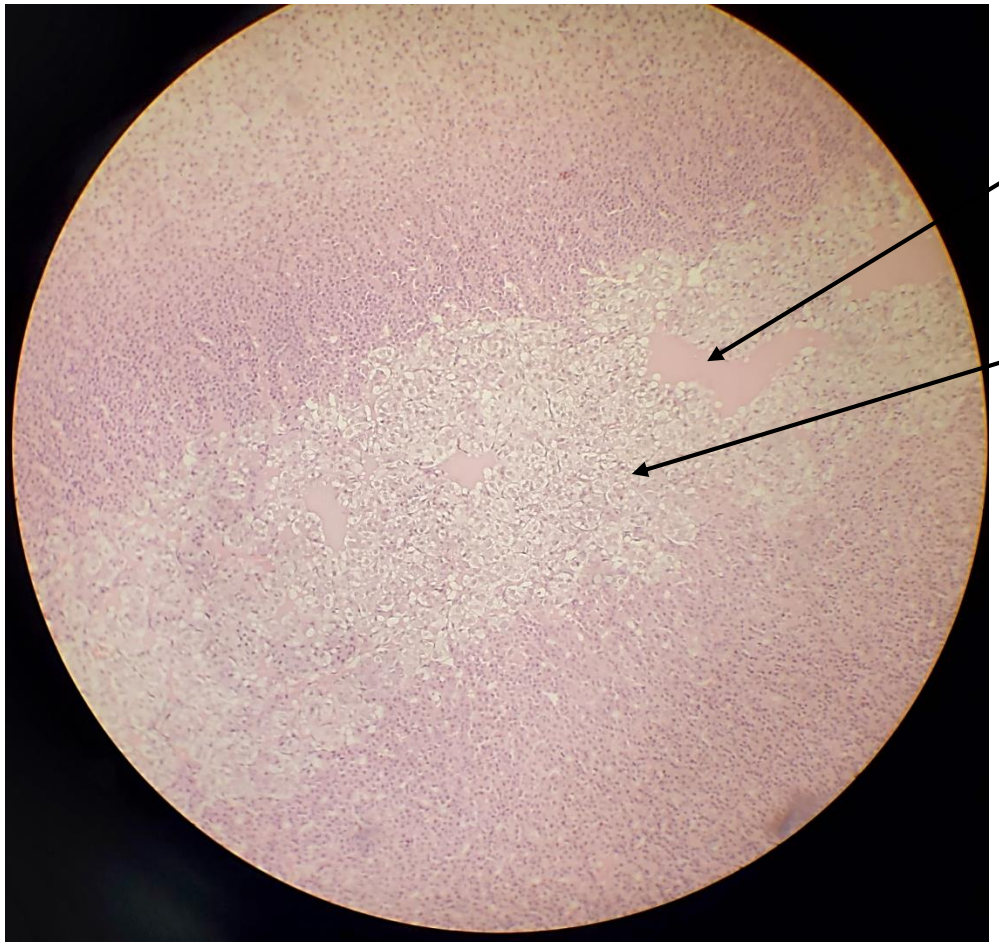


NOTES:

- Suprarenal gland is formed of cortex and medulla.
- Cortex is peripheral while medulla lies in the center.
- The main character of suprarenal gland that its cortex is divided into three zones.

Suprarenal gland cont.

Adrenal medulla - H.E stain



Blood vessel

Chormaffin cells

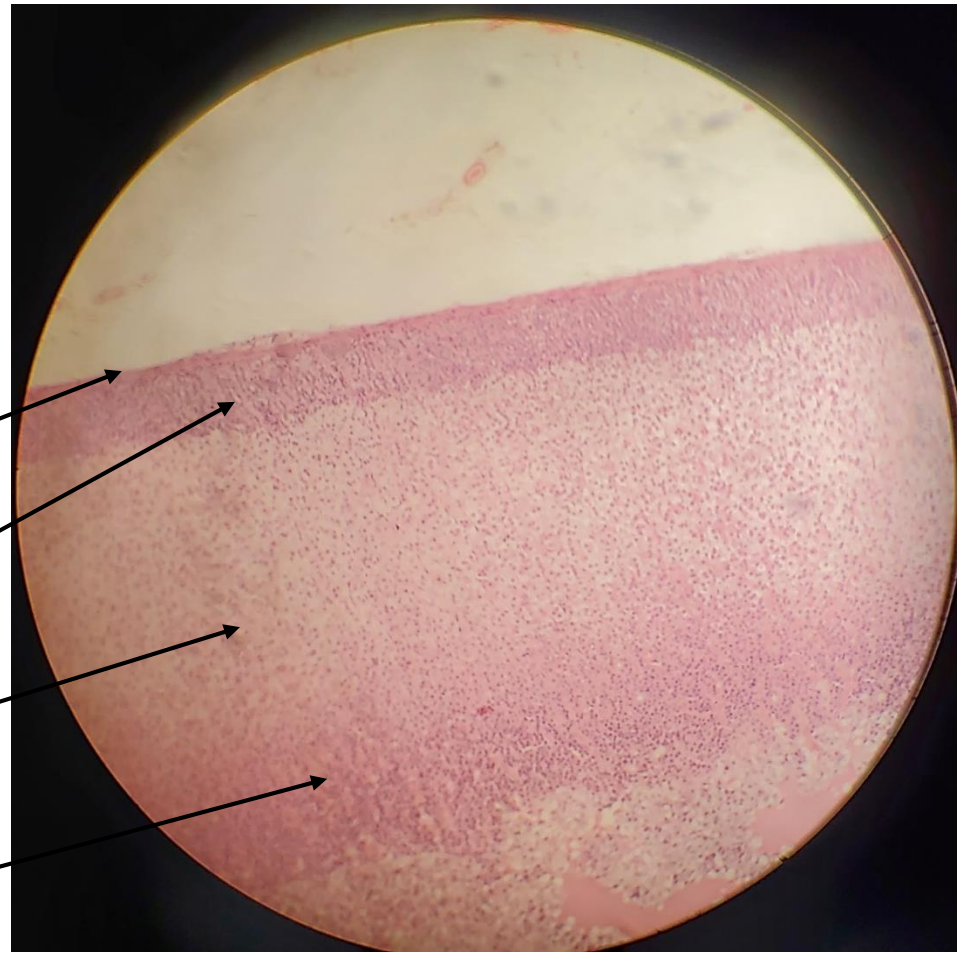
Capsule

Zona glomerulosa

Zona fasciulata

Zona Reticularis

Adrenal cortex - H.E stain

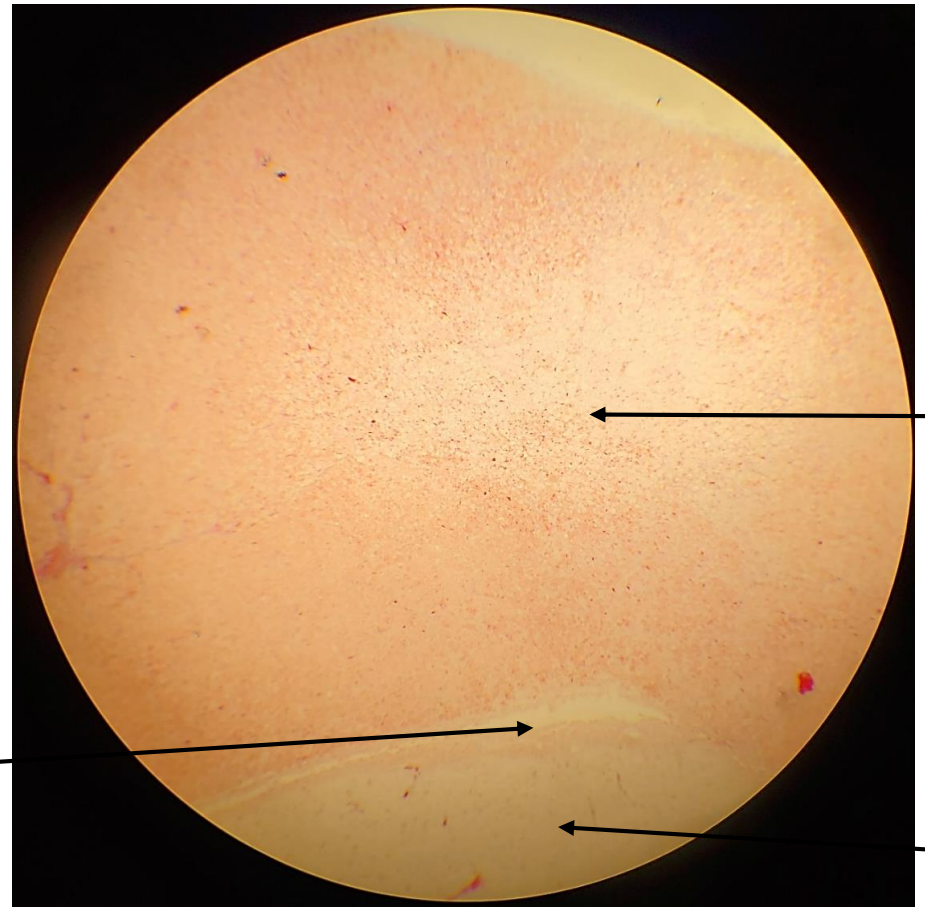


NOTES:

- Cortex is formed of three layers : Zona glomerulosa which is the outer most and smallest layer - Zona fasciulata the middle and the largest layer -Zona Reticularis the inner most layer.
- Medulla contain chormaffin cells and blood vessel.

Pituitary gland

Special stain

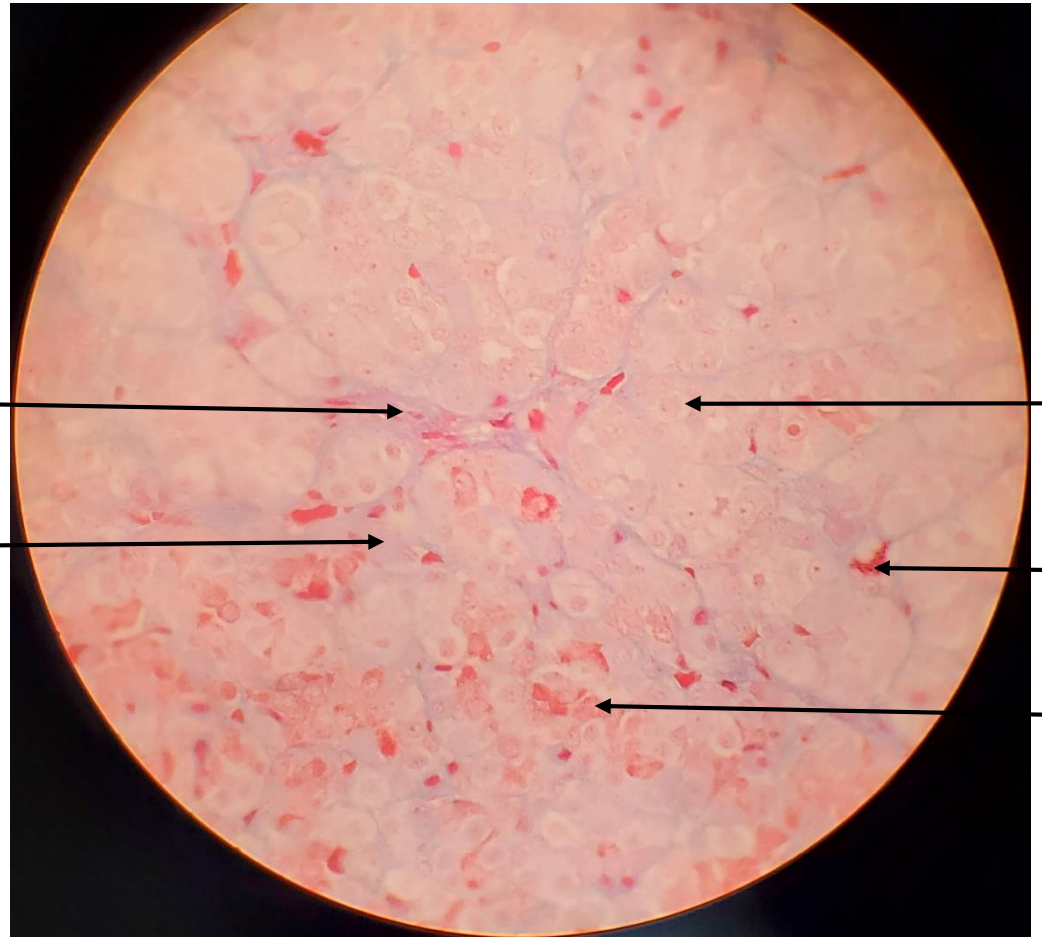


NOTES:

- Pars distalis is a part of the anterior lobe.
- Pars intermedia is the intermediate lobe.
- Pars nervosa is the posterior lobe.

Pituitary gland - Pars distalis

Special stain

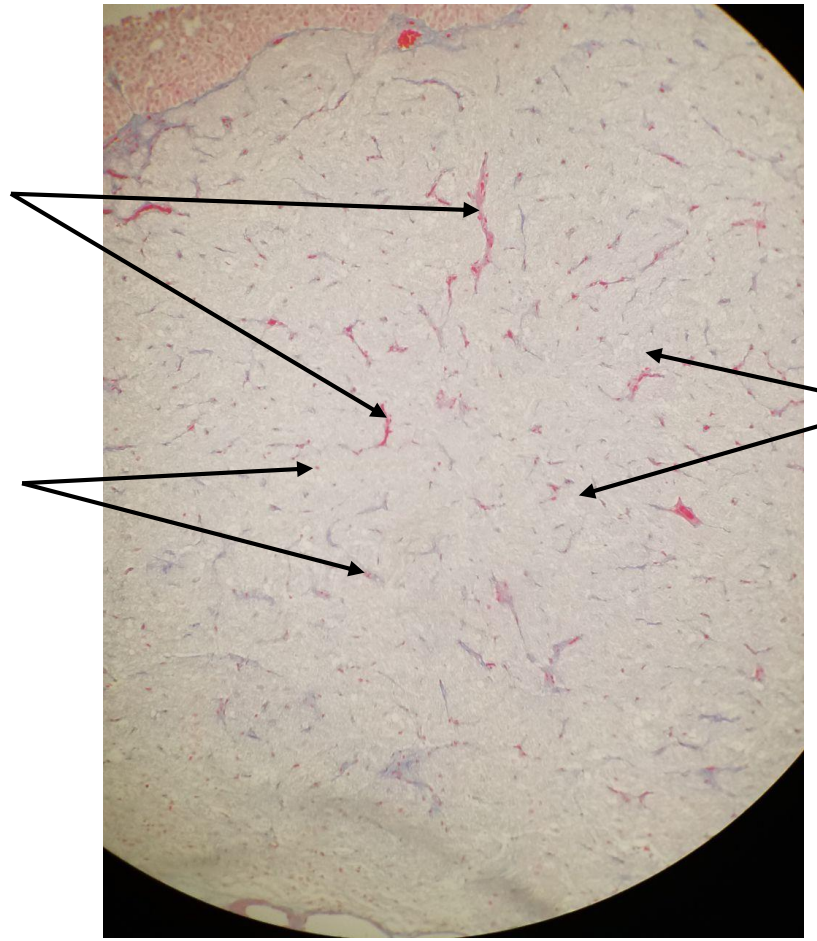


NOTES:

- Parenchyma of pars distalis consists of two types of cells : Chromophobes which its cytoplasm is not stained with a pink nucleus - Chormophile cells and they are divided into acidophilic cells which are red in color and basophilic cells which are blue in color.
- There are connective tissue fibers and blood vessels between parenchyma.

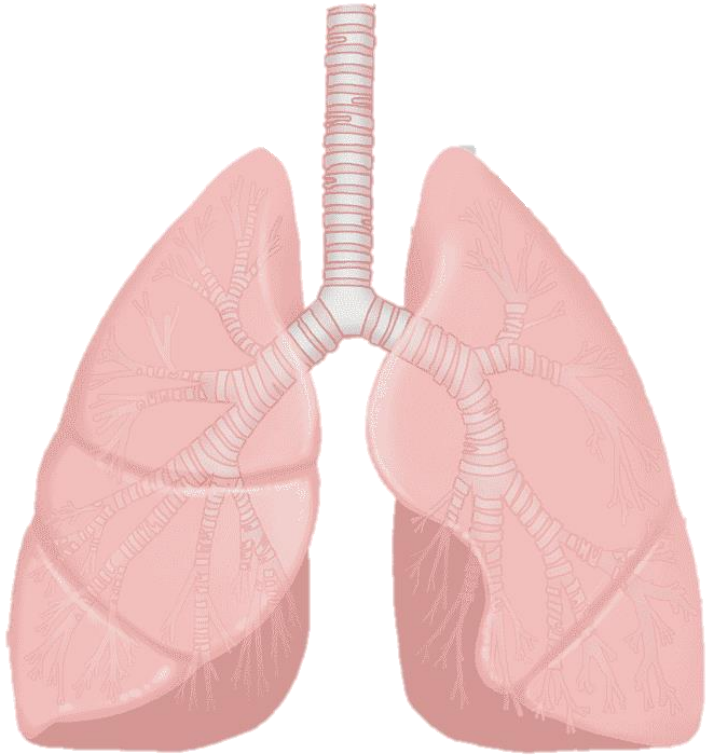
Pituitary gland - Pars nervosa

Special stain



NOTES:

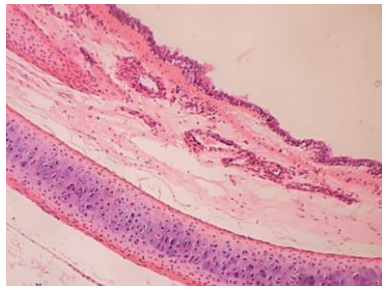
- Pars nervosa consists of :
  - distributed blood vessels
  - nerve fibers are the white color in the slide .
  - pituicytes are purple in color .



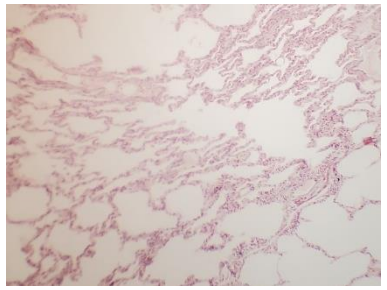
RESPIRATORY SYSTEM

Respiratory system

Trachea



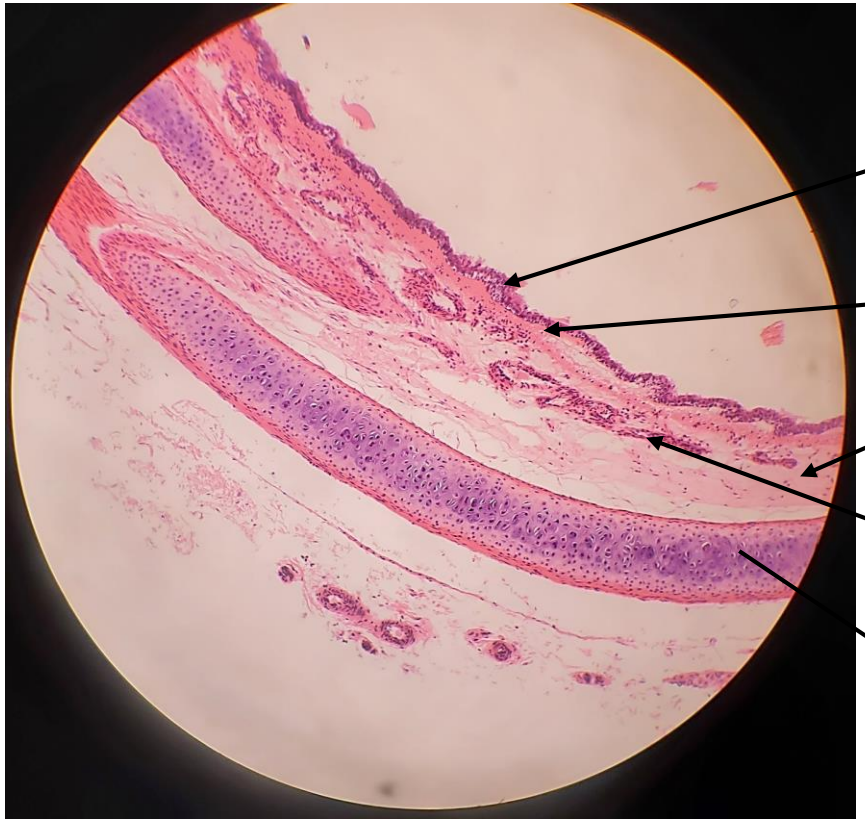
Lung



- Alveoli
- Alveolar duct
- Intrapulmonary bronchi
- Respiratory bronchiole
- Terminal bronchiole

Trachea

H.E stain



Pseudostratified epithelium

Lamina propria

submucosa

Tracheal gland

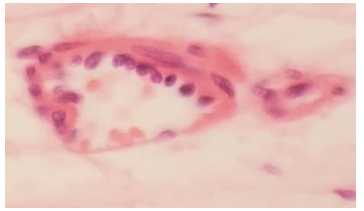
Hyaline cartilage

H.E stain

NOTES:

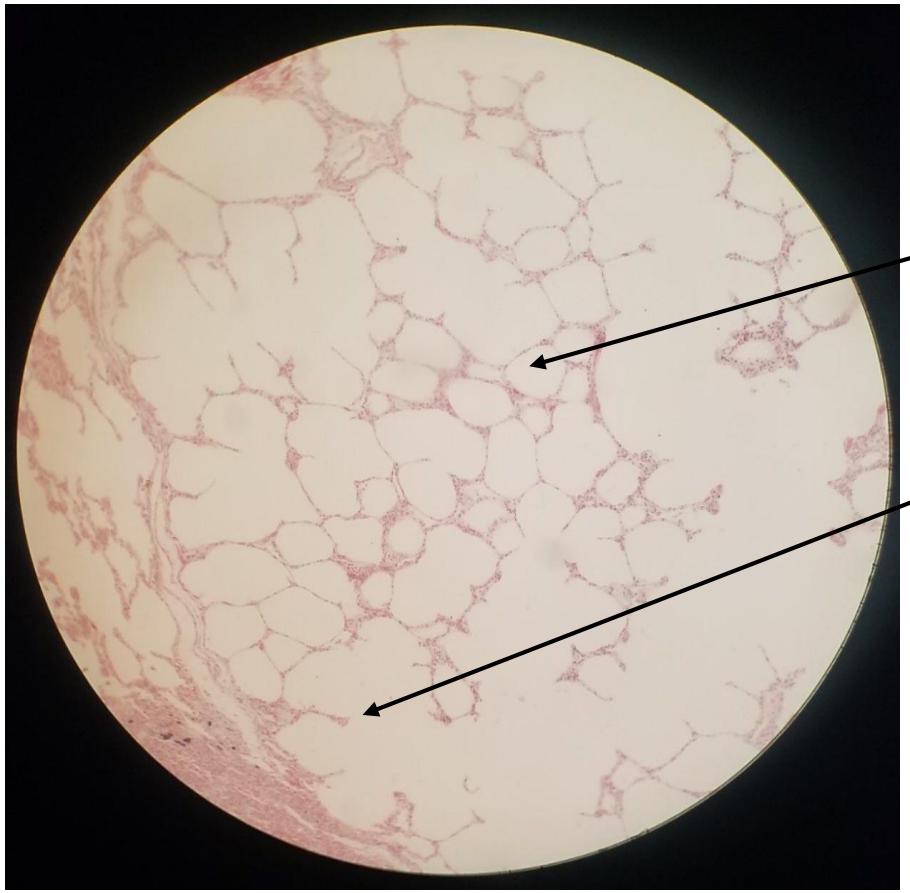
- It has four layers like GIT except musculosa layer is replaced by cartilage.
- Mucosa consists of pseudostratified epithelium and lamina propria. Muscularis mucosae is replaced by elastic fibers but they don't appear because of the process of making the slide.
- Submucosa contain tracheal glands with cuboidal epithelium.
- Musculosa is replaced by continuous C-shape hyaline cartilage (the most clear characteristic).
- Adventitia consist of a connective tissue.

Tracheal gland



Lung

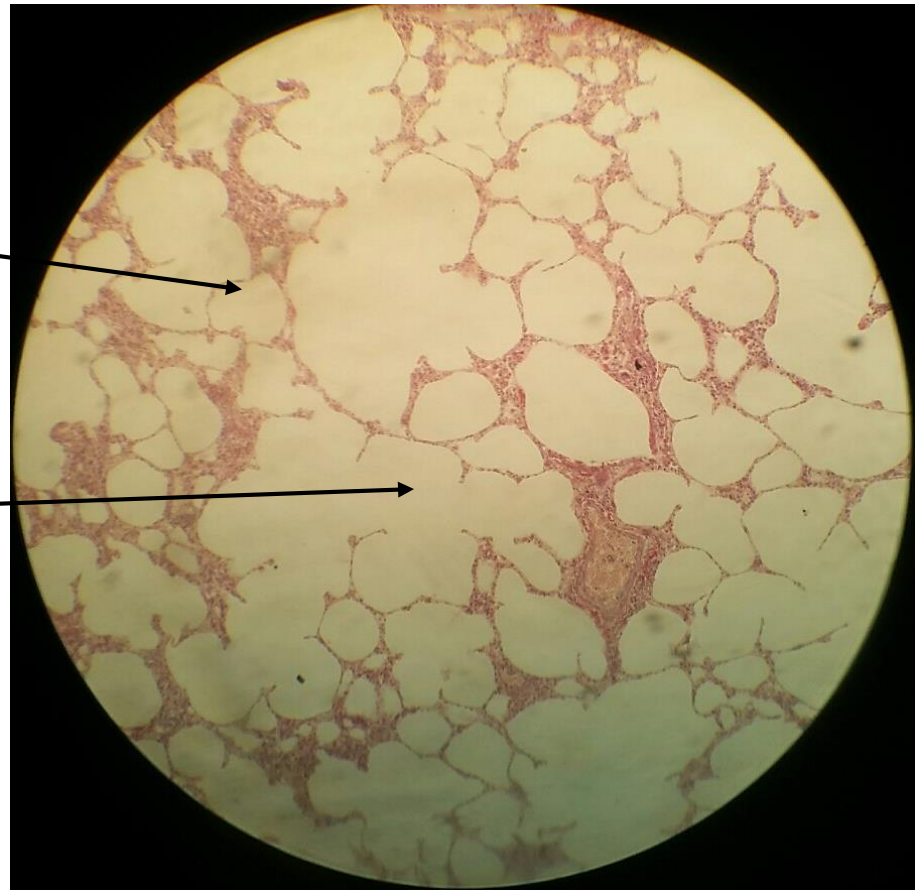
H.E stain



Alveoli

alveolar sac

H.E stain

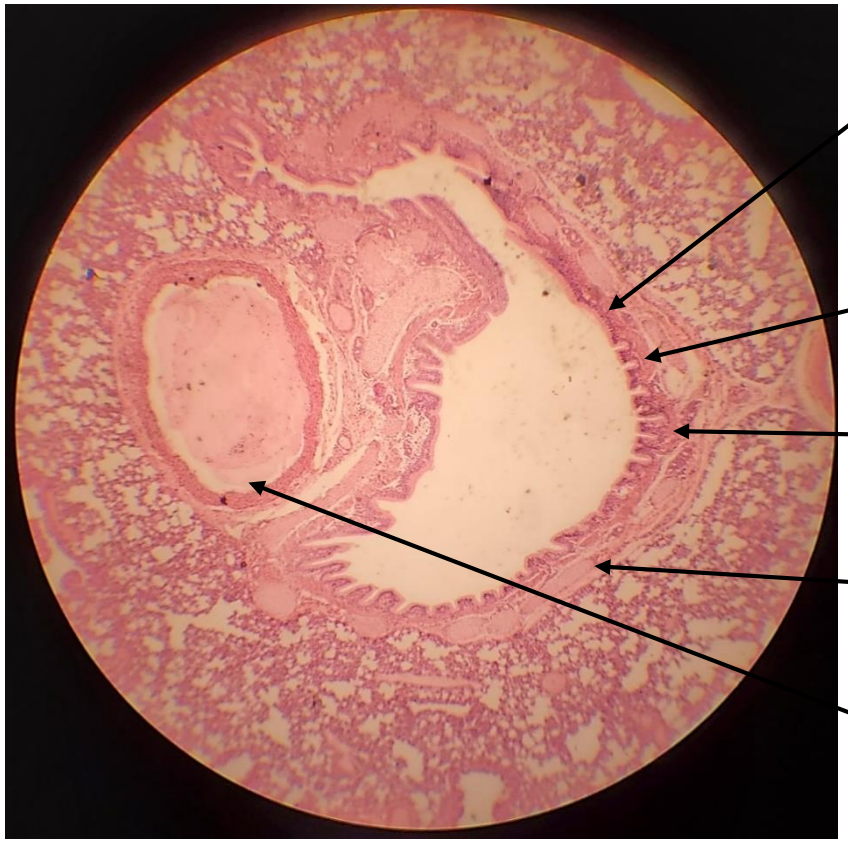


NOTES:

- Lung consists of alveoli and sacs or ducts.
- Lung alveoli are lined by simple squamous epithelium.
- When group of lung alveoli open in the same area, the area is called alveolar sac or duct.

Lung - Intrapulmonary bronchi

H.E stain



Pseudostratified Columnar epithelium

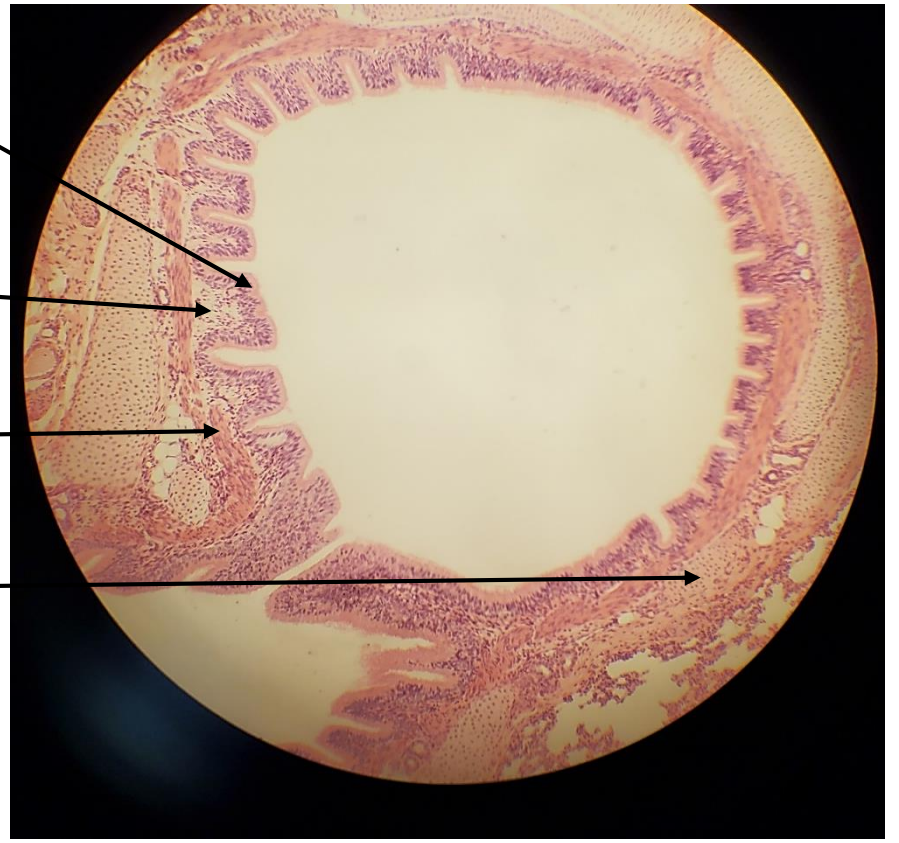
Lamina propria

Elastic fibers

Hyaline cartilage

Blood vessel

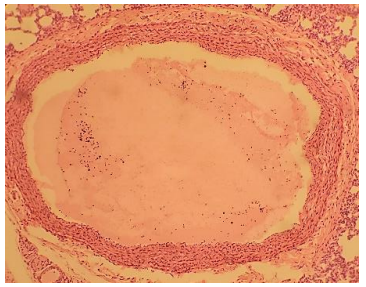
H.E stain



NOTES:

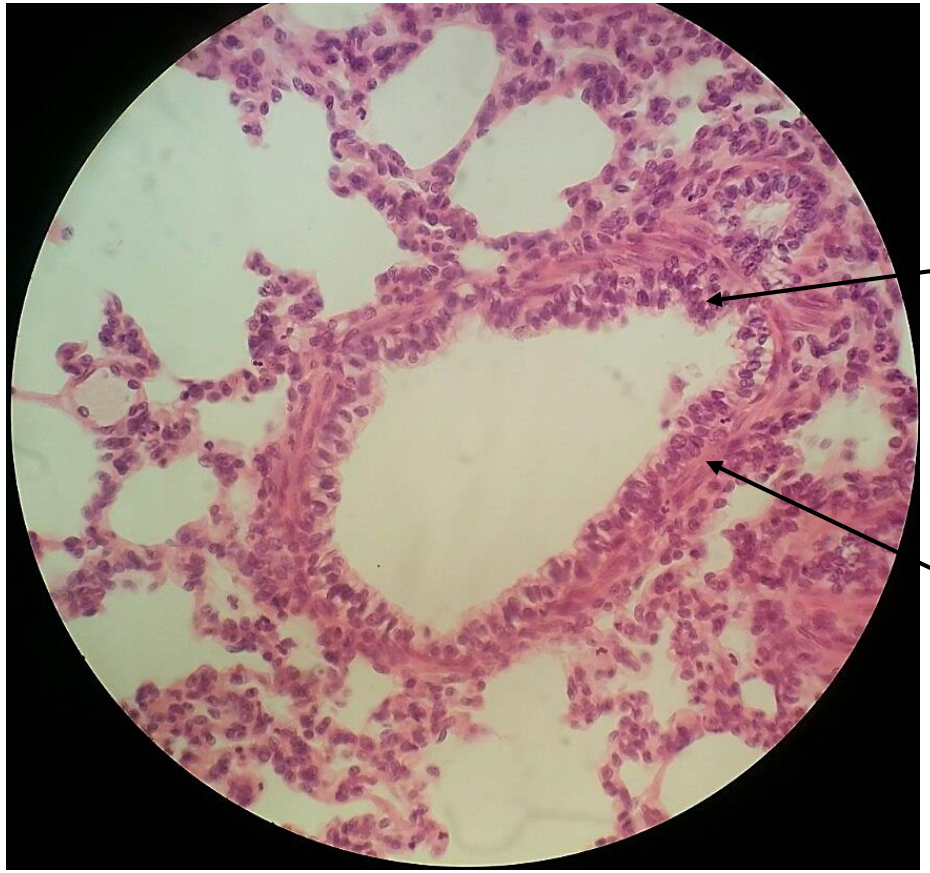
- It has the same structure of trachea except the cartilage here is segmented not continuous (the most clear characteristic).
- Submucosa and the cartilage may appear as one layer.

Blood vessel



Lung - Terminal bronchiole

H.E stain

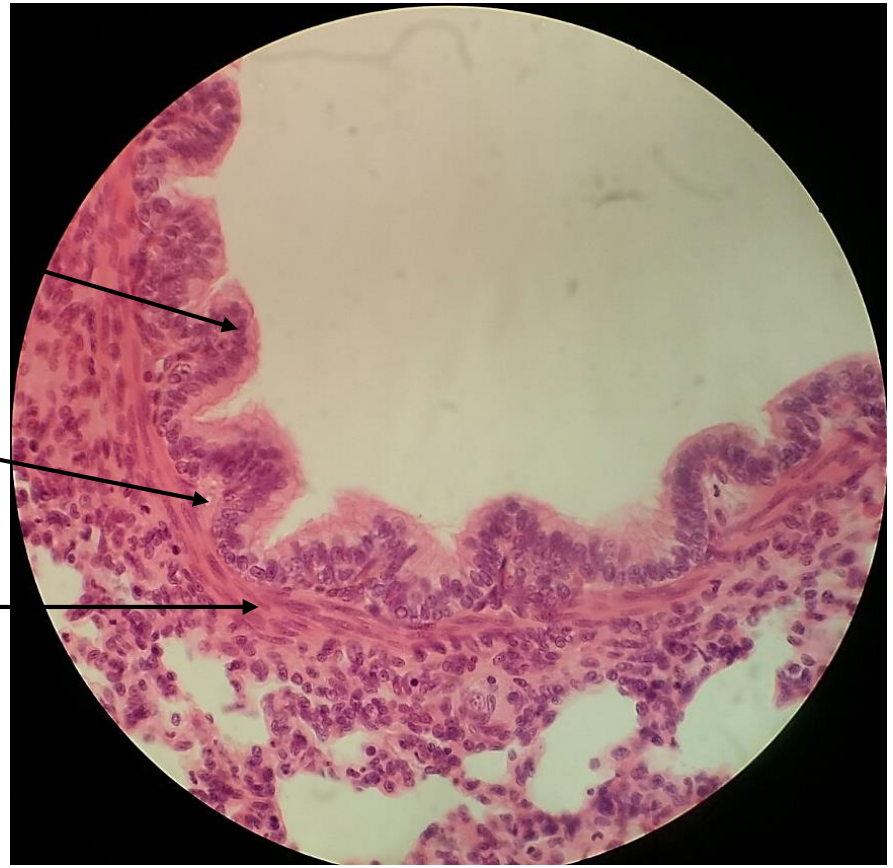


Simple columnar epithelium

Lamina propria

Smooth muscle

H.E stain



NOTES:

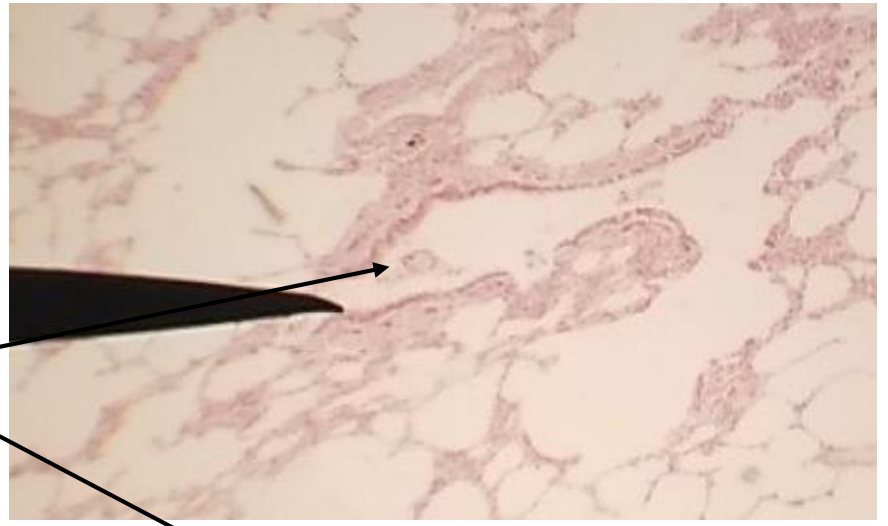
- Has three layers: - epithelium which is Simple columnar – lamina propria – smooth muscle
- They are closed. Blood vessels are also closed but terminal bronchioles have simple columnar surface while the blood vessels have simple squamous surface.

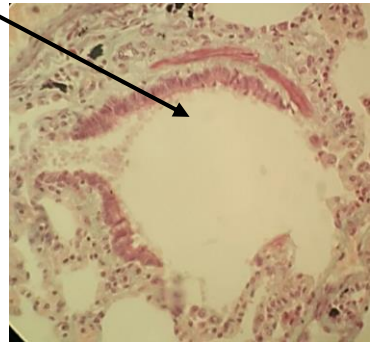
Lung - Respiratory bronchiole

H.E stain

Respiratory bronchiole

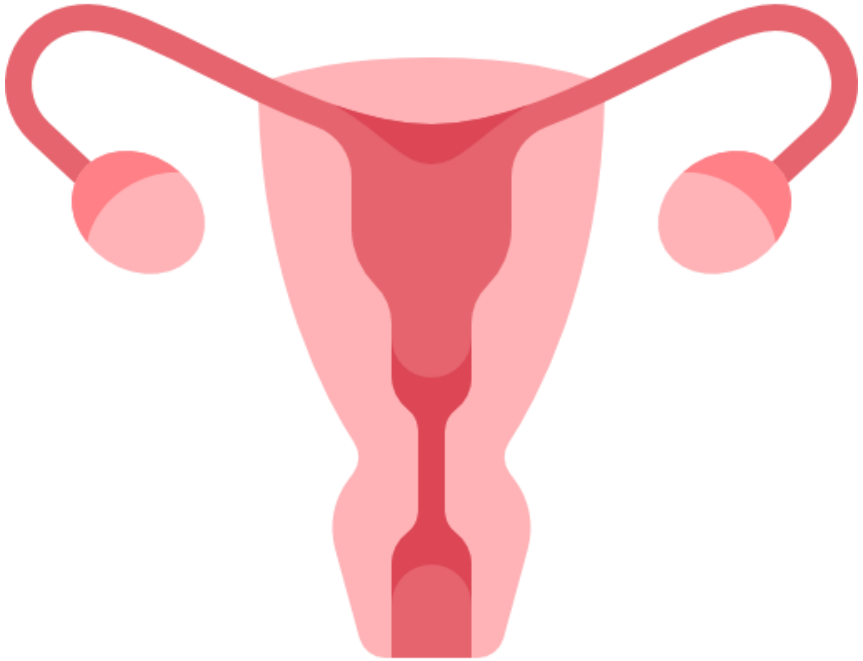
H.E stain





NOTES:

- Has a similar structure of terminal bronchioles but they are not closed (most clear) and have simple cuboidal epithelium rather than simple columnar this characteristic is not clear under microscope
- They open into the alveolar ducts.

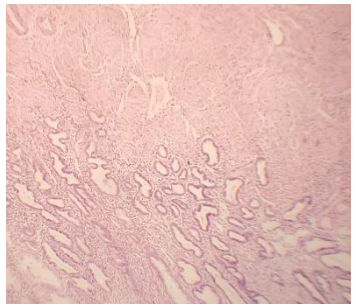


FEMALE GENITAL SYSTEM

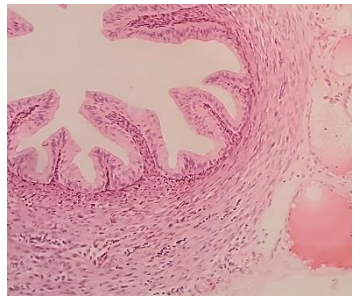
Female genital system

Vagina

Uterus



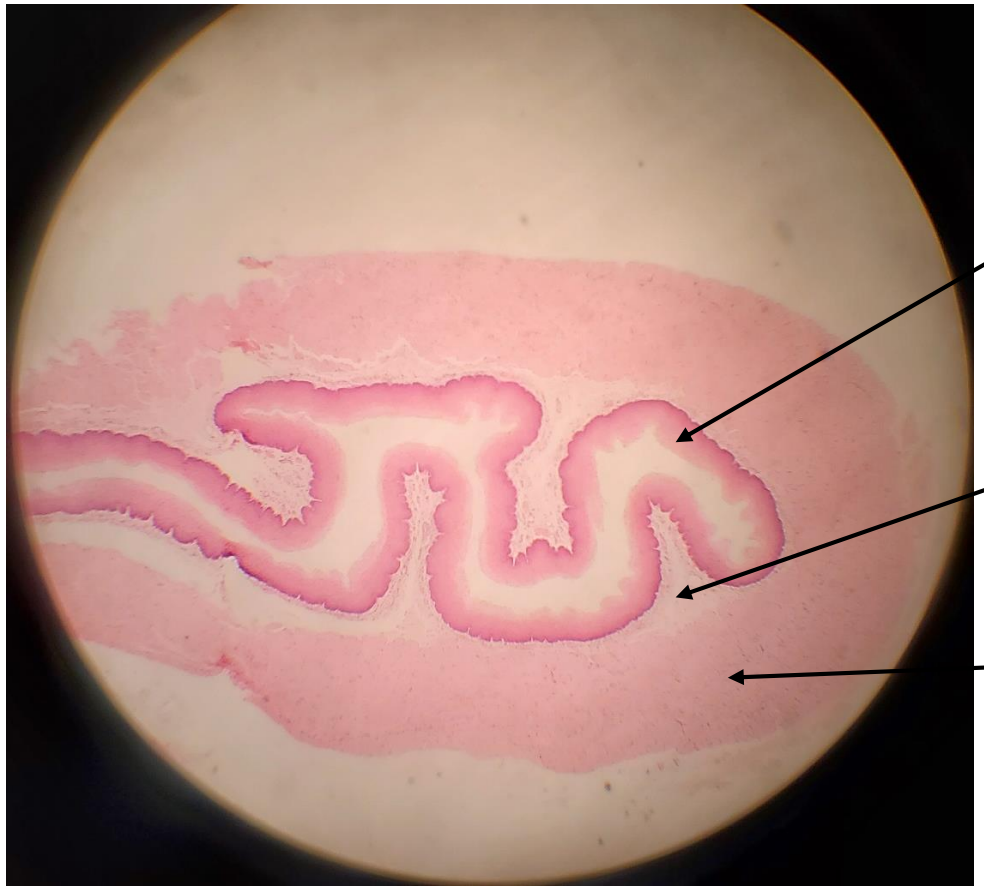
Uterine tube



Ovary

Vagina

H.E stain

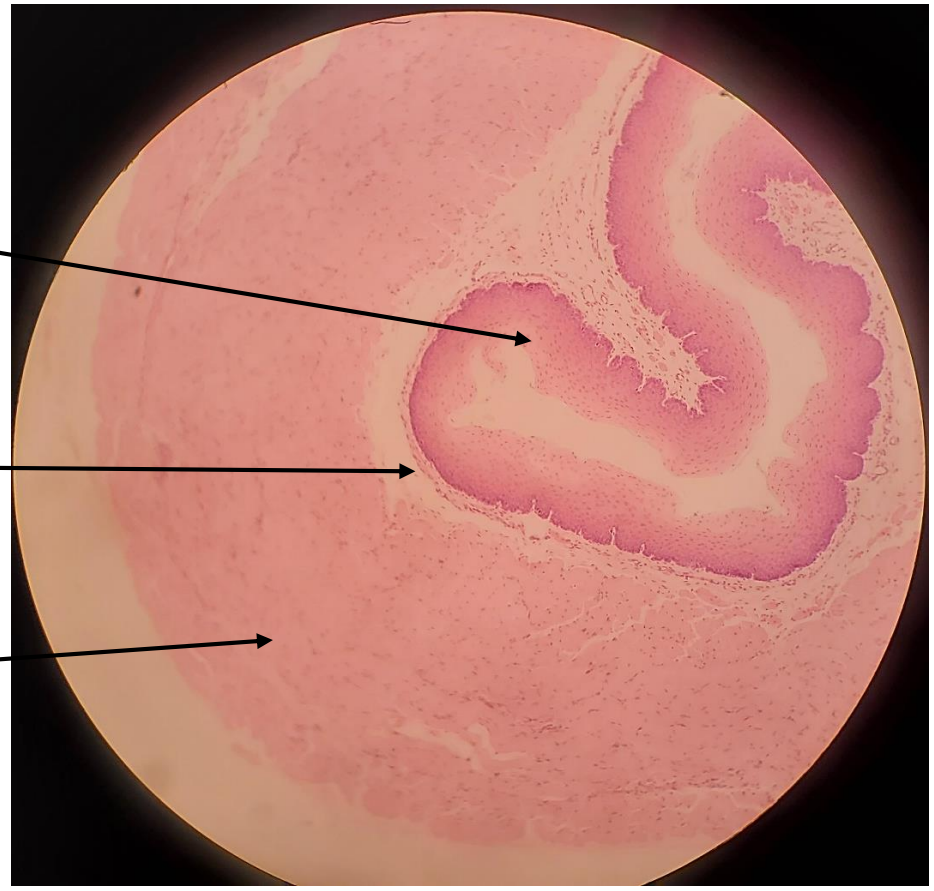


stratified squamous epithelium

Lamina propria

Smooth muscle

H.E stain



NOTES:

- The main structure is like GIT. Except there is no muscularis mucosa and no submucosa.
- The mucosal epithelium is stratified squamous epithelium.
- Musculosa consists of smooth muscle.
- The slide may appear like the esophagus but The later has submucosa containing esophageal glands in it.
- You must see the clear new esophagus slide and compare between them.

Esophagus – just to compare with vagina

New slide

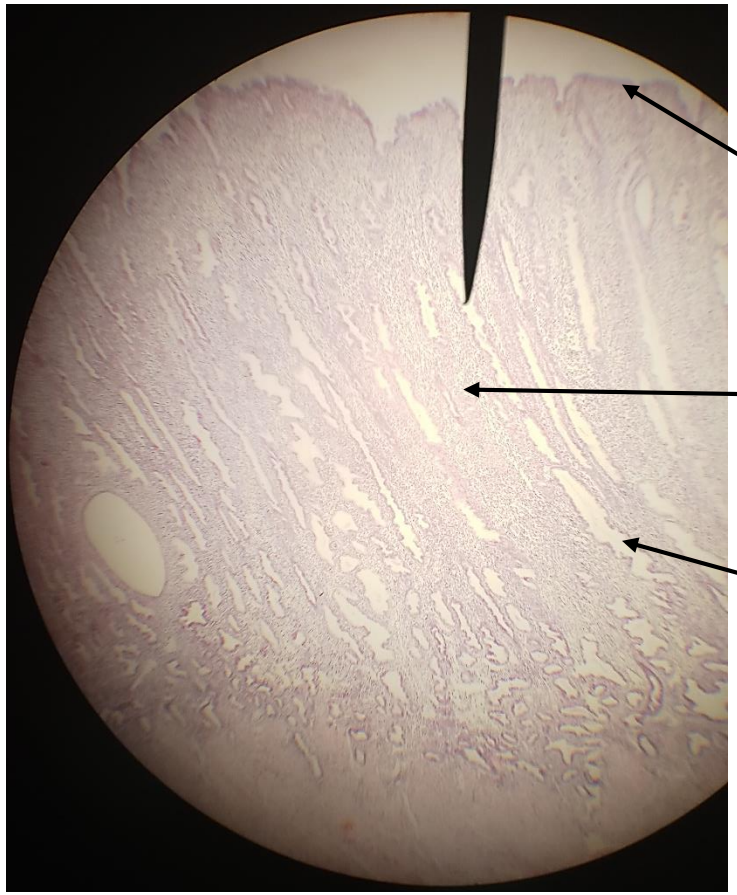
Old slide

ملاحظة مهمة:

الشريحة القديمة حق ال esophagus مايضهرش فيها تراكيب ال submucosa مثلما اتكلمنا من قبل .. لذلك فهي كانه نسخه من شريحة ال vagina لكن قالت الدكتورة حليمة انه ما بيجي بالاختبار الا سلايد واضح ومافيش قلق من هذا الشيء.

Uterus - endometrium

H.E stain

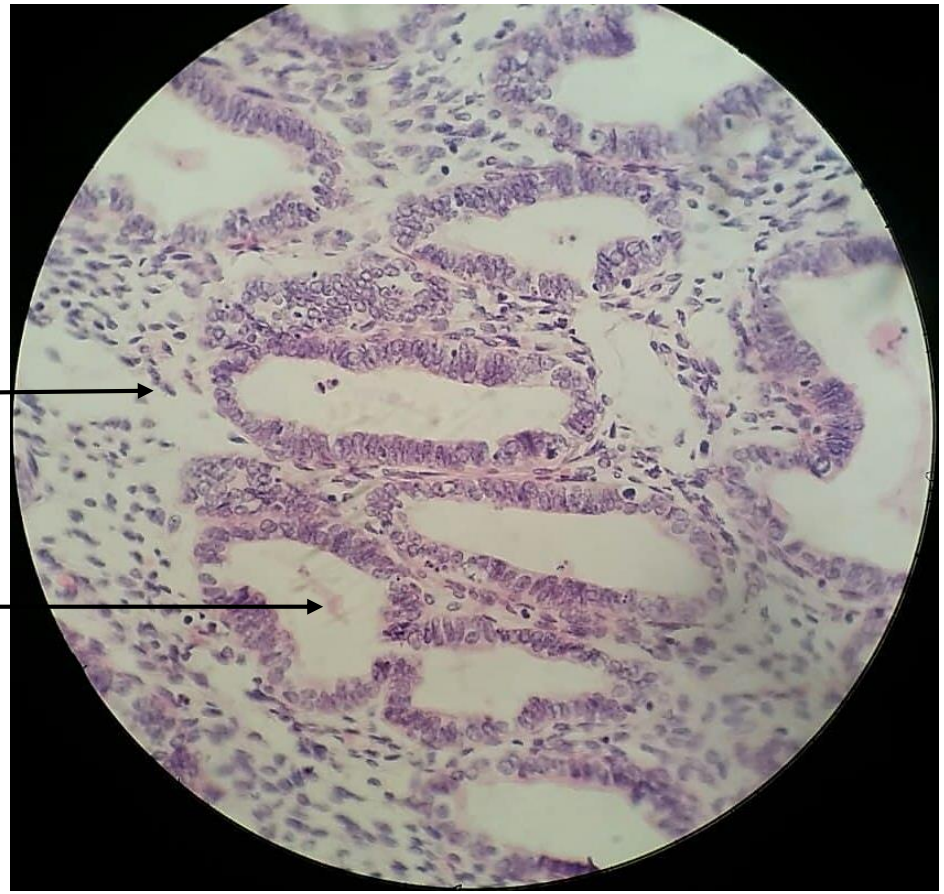


Simple columnar epithelium

Lamina propria

Uterine glands

H.E stain



NOTES:

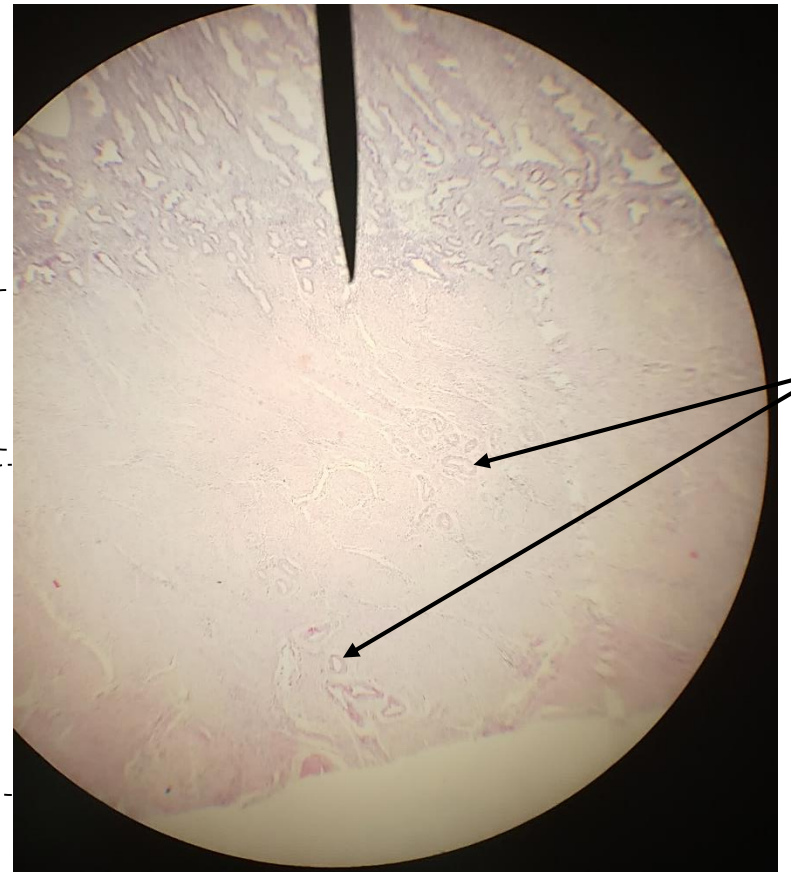
- Uterus consists of three layers: endometrium – myometrium – perimetrium.
- the endometrium consists of simple columnar epithelium ciliated and non-ciliated, lamina propria and uterine glands in the lamina propria.

Uterus - myometrium

NOTES:

- Myometrium appears with three layers. Submucosa layer, vascular layer and subserosa layer.
- The three layers are connective tissue and muscles which appear longitudinal and oblique
- The vascular layer consists also blood vessels besides the connective tissue and muscle.
- The last layer we see in this slide is the vascular layer. the subserosa layer and perimetrium don’t appear.
- Perimetrium consists of connective tissue.

H.E stain

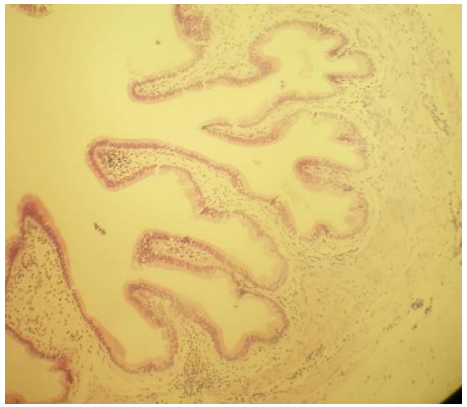


Uterine tube

H.E stain

Uterine tube

Gall bladder



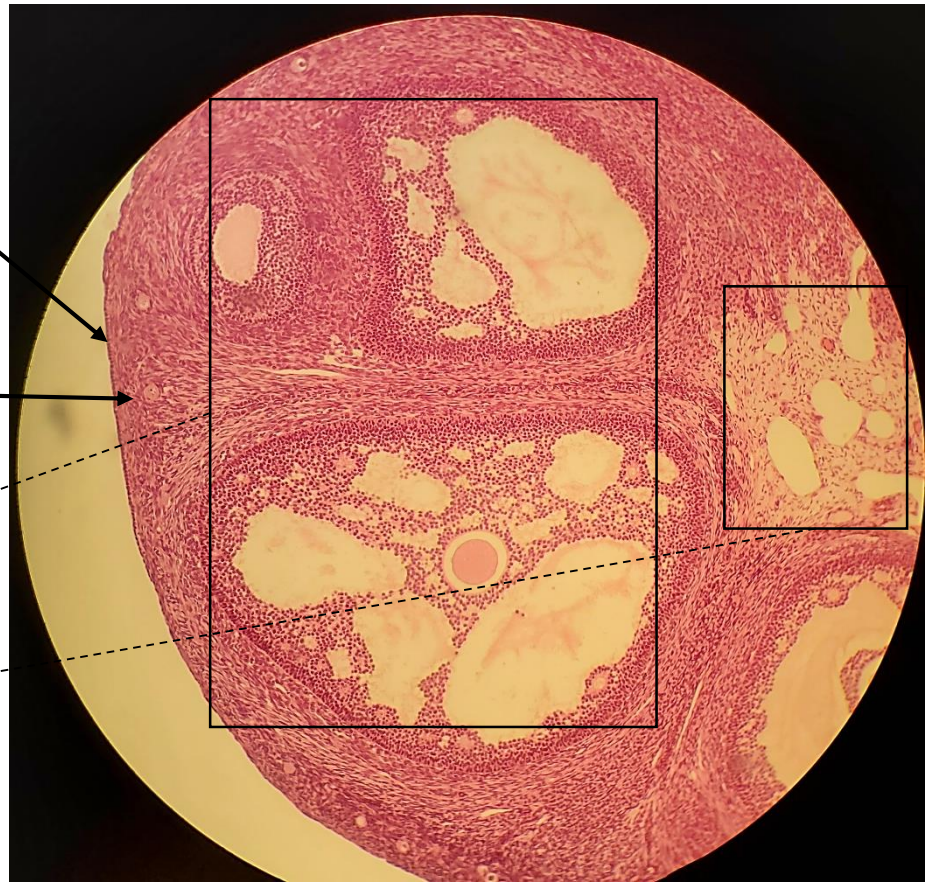
NOTES:

- The main structure is like GIT. Except there is no muscularis mucosa and no submucosa.
- The mucosal epithelium is simple columnar epithelium Simple columnar epithelium ciliated and non-ciliated.
- The slide has the same structure of gall bladder but with less folding and more blood vessel.

Ovary

H.E stain

H.E stain



Germinal epithelium

tunica albuginea

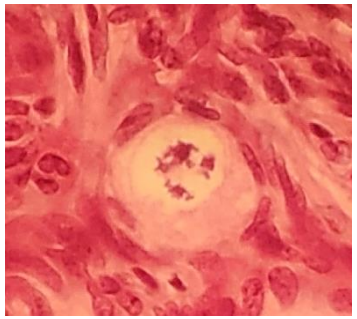
Cortex

Medulla

NOTES:

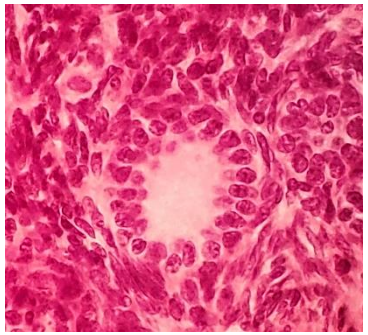
- Ovary is formed of stroma and parenchyma
- The stroma is formed of cortex consists of ovarian follicles and medulla consists of connective tissue and blood vessels.
- The parenchyma consists of interstitial cells.
- The ovary is surrounded by a layer of simple cuboidal epithelium called germinal epithelium. It appears squamous in older female. The layer beneath it is called tunica albuginea which is a connective tissue.
- Ovarian follicles are discussed in the next page.

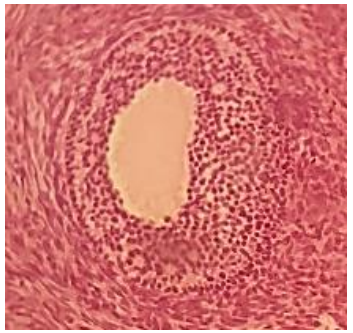
Primordial follicle



Lined by simple squamous epithelium

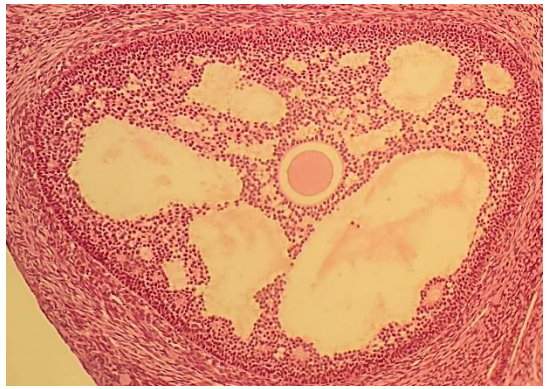
Primary follicle





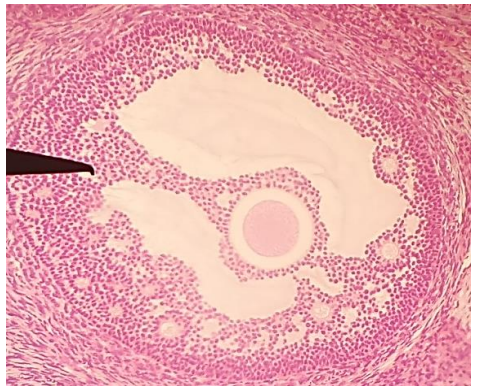
Lined by simple cuboidal epithelium
which be stratified in its late stage

Secondary follicle



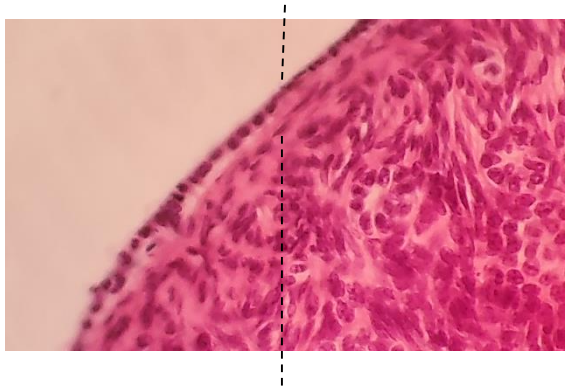
Has many cavities (antra)

Mature follicle

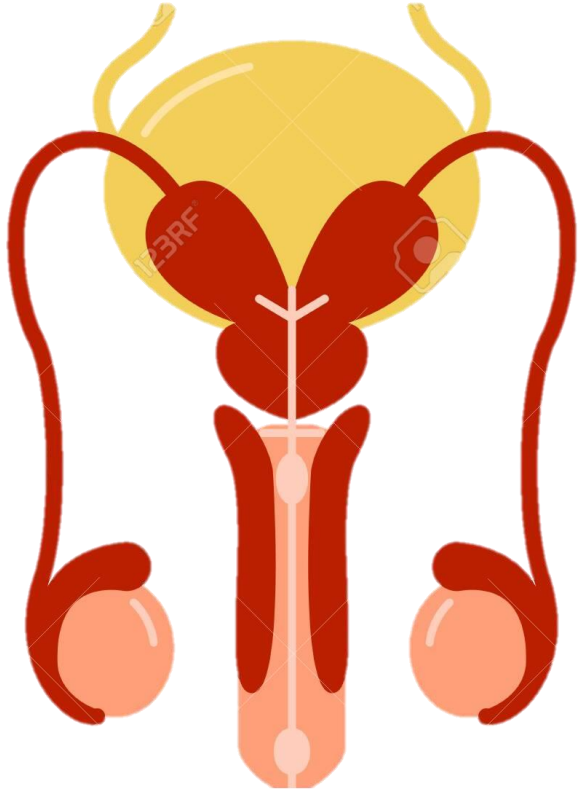


Has one or two antra

germinal epithelium



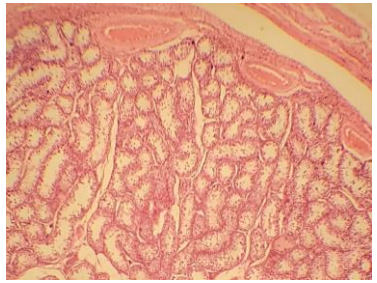
tunica albuginea



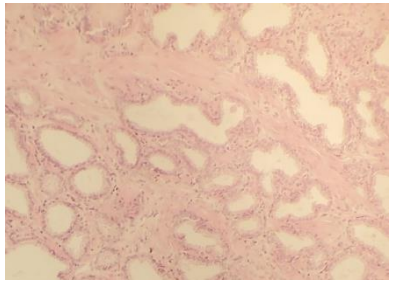
MALE GENITAL SYSTEM

Male genital system

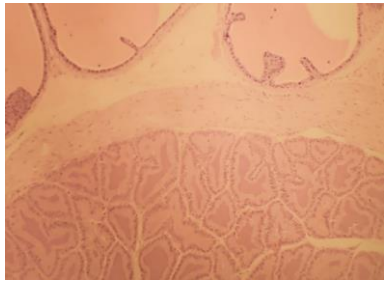
Testis



Prostate

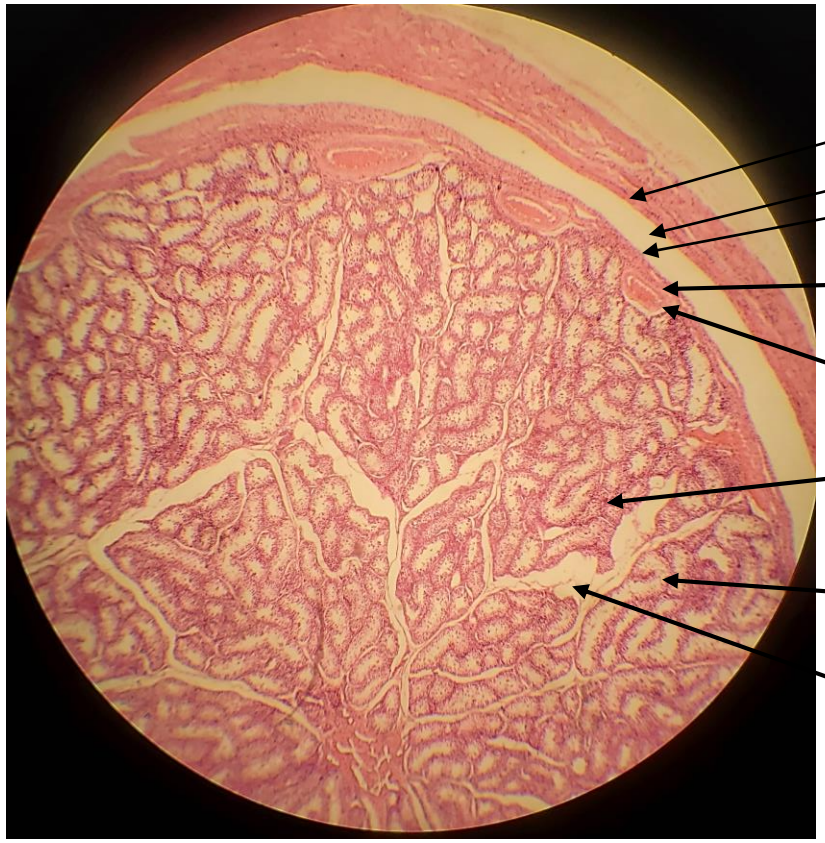


Seminal vesicle



Testis

H.E stain



Tunica vaginalis:

parietal layer

cavity

visceral layer

Tunica albuginea

Tunica vasculosa

Interstitial tissue

Seminiferous tubule

Septa

H.E stain

NOTES:

- The testis is surrounded by a capsule consists of three layers called Tunica vaginalis ,Tunica albuginea and Tunica vascular. The tunica albuginea sends extensions between the seminiferous tubules called septa.
- seminiferous tubules have many layers of spermatogenic cells represent the steps of formation the sperm called Spermatogenic compartment.
- There is an interstitial connective tissue between the seminiferous tubules.
- Interstitial cells of ledge appear in the interstitial tissue.

Testis cont. - seminiferous tubules

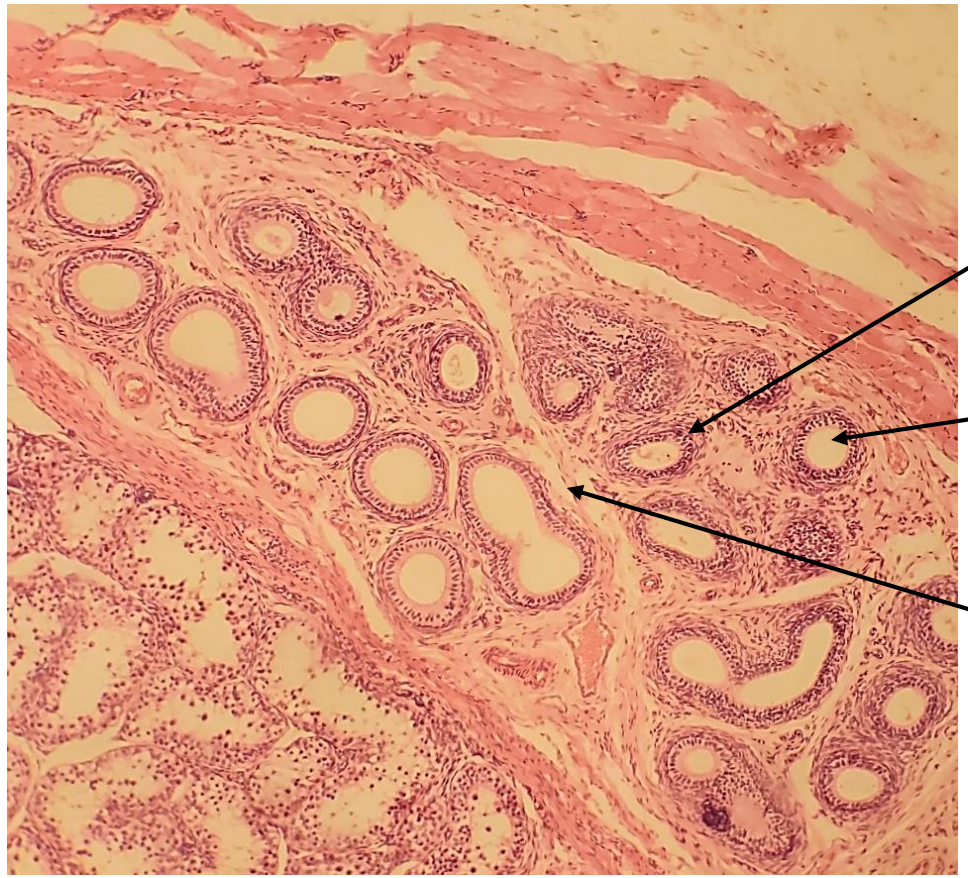
H.E stain

NOTES:

- The basal cells with clear nucleus are the spermatogonia.
- Primary spermatocyte appear with highly coiled chromatin and they are the most numerous type in the section
- Sertoli cells are found between the spermatogonic cells. They have pale nucleus.
- secondary spermatocytes don't appear in the section due to its fast division into early spermatids.
- The seminiferous tubules are surrounded by myoid cells which are spindle in shape and have flat nucleus. They help in pushing the sperm out of the seminiferous tubules.

Epididymis

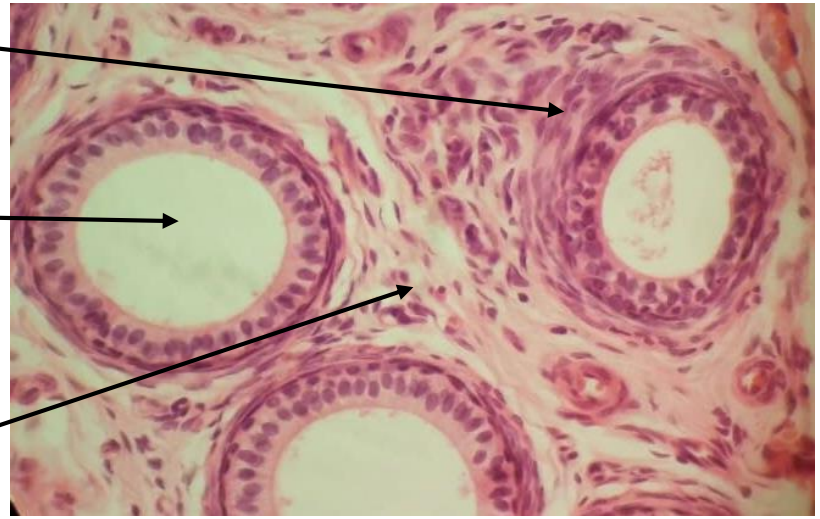
H.E stain



Smooth muscle

Duct

Connective tissue



NOTES:

- It is a highly convoluted duct in section it appears as many ducts.
- The epithelium layer is pseudostratified columnar epithelium with stereocilia.
- A circular smooth muscle layer surrounds the basement membrane of the epithelium.
- Connective tissue between the ducts

Vas deferens

H.E stain

NOTES:

- It consists of mucosa, musculosa and adventitia.
- The mucosa consists of : pseudostratified columnar epithelium and lamina propria
- Musculosa consists of three layers of muscles.
- Adventitia is a layer of loose connective tissue.
- it has a thick wall and a narrow lumen.

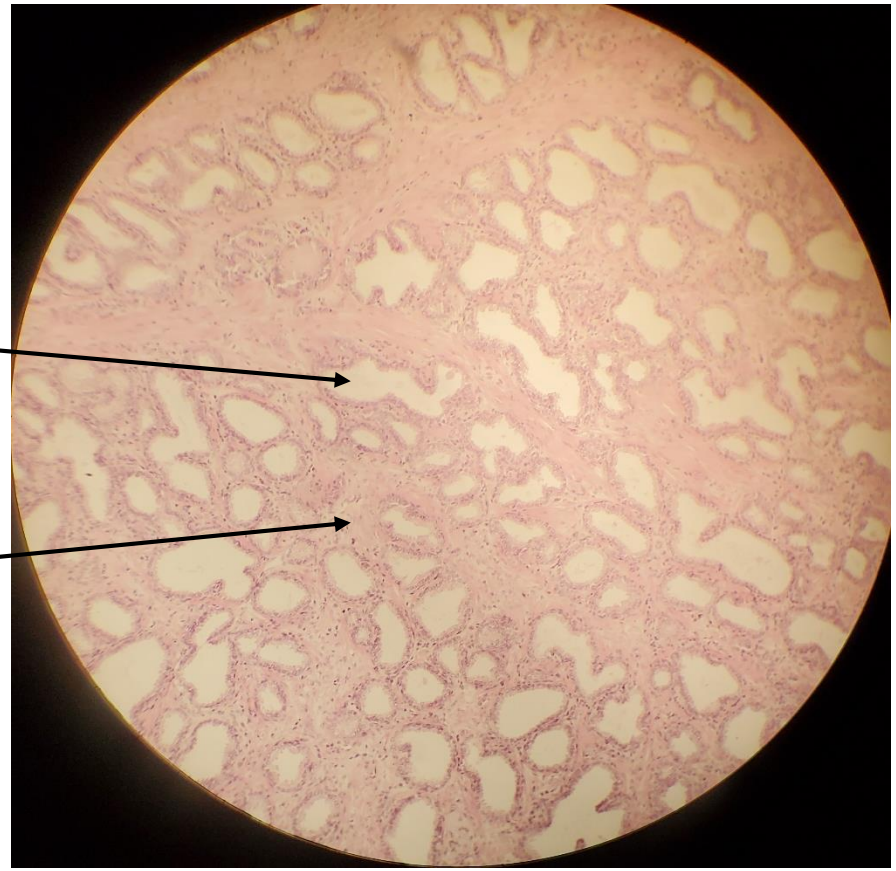
Prostate

H.E stain

prostatic gland

Stroma

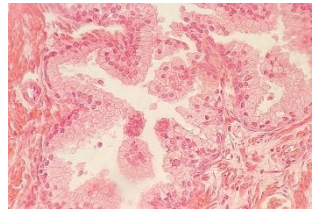
H.E stain



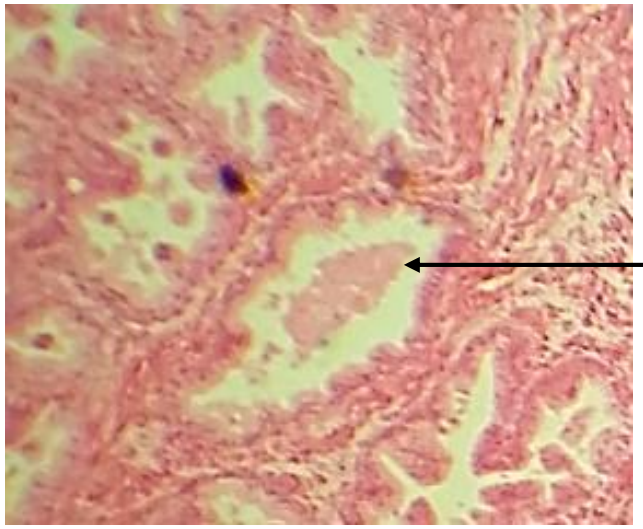
NOTES:

- It consists of stroma and parenchyma.
- Stroma consists of fibromuscular capsule and trabecula.
- Parenchyma consists of prostatic glands which lined by simple columnar epithelium (lightly folded).

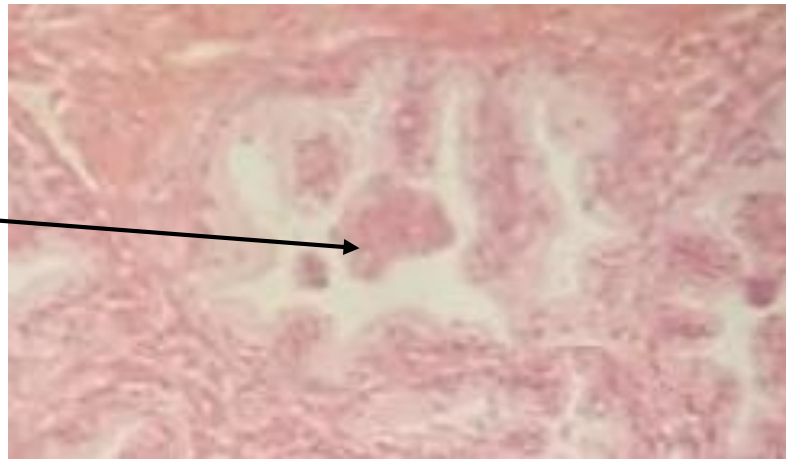
Prostatic gland



Prostate cont.



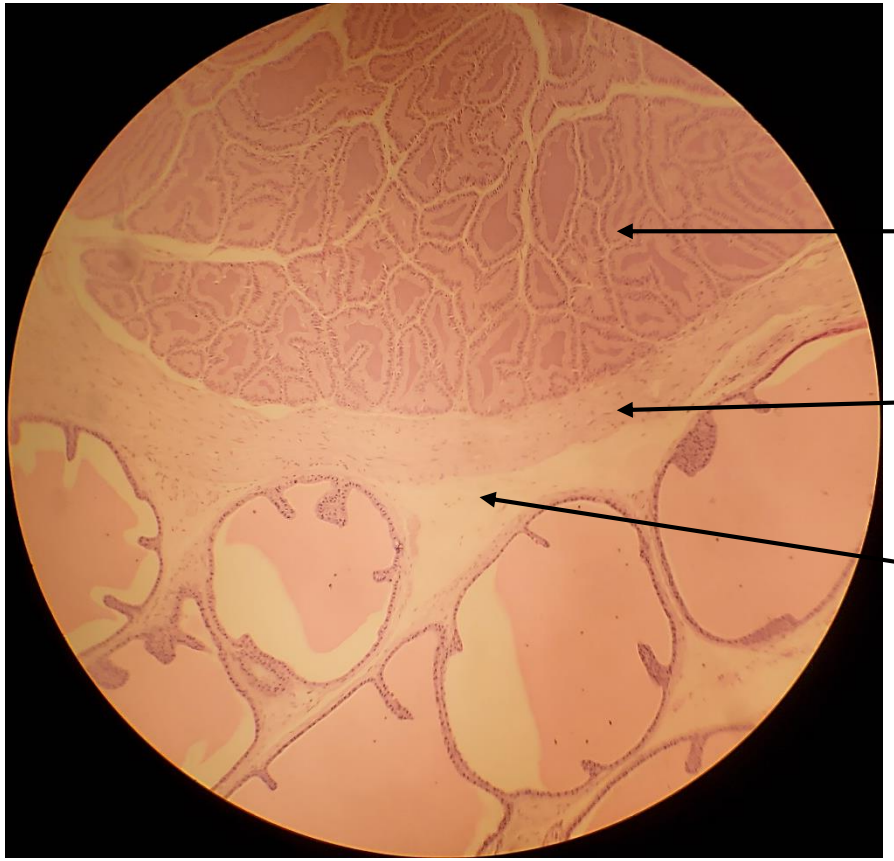
corpora amylacea



NOTE:
In older men there are prostatic concretions (corpora amylacea) appear which are lamellate structures formed by precipitation of the secretory material inside some secretory acini and may become calcified

Seminal vesicle

H.E stain



Mucosa

Musculosa

Adventitia

H.E stain

NOTES:

- The mucosa is highly folded and the lining epithelium is columnar epithelium or pseudostratified columnar epithelium
- The musculosa is formed of inner circular and outer longitudinal layers.
- The adventitia is a layer of connective tissue.

The End